

NAVSHIPS 91254

UNCLASSIFIED

INSTRUCTION BOOK

for

TUBE TESTER

TV-3/U

Manufactured by

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
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for

U. S. NAVY DEPARTMENT

BUREAU OF SHIPS

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To: All Activities Concerned with
the Installation, Operation
and Maintenance of the Subject
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Subj: Instruction Book for Tube Tester
TV-3/U (NAVSHPIS 91254).

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CONTRACTURAL GUARANTEE

The Contractor guarantees that at the time of delivery thereof the articles provided for under this contract will be free from any defects in material or workmanship and will conform to the requirements of this contract. Notice of any such defect or nonconformance shall be given by the Government to the Contractor within one year of the delivery of the defective or nonconforming article, unless a different period of Guaranty is specified in the schedule. If required by the Government within a reasonable time after such notice, the Contractor shall, with all possible speed, correct or replace the defective or nonconforming article or part thereof. When such correction or replacement requires transportation of the article or part thereof, shipping costs, not exceeding the usual charges, from the delivery point to the Contractor's plant and return, shall be borne by the Contractor; the Government shall bear all other shipping costs. This Guaranty shall then continue as to corrected or replacing articles or, if only parts of such articles are corrected or replaced, to such corrected or replacing parts, until one year after the date of redelivery, unless a different period of Guaranty is specified in the schedule. If the Government does not require a correction or replacement of a defective or nonconforming article, the Contractor, if required by the contracting officer, within a reasonable time after the notice of defect or nonconformance, shall repay such portion of the contract price of the article as is equitable in the circumstances.

INSTALLATION RECORD

Contract Number NObsr 42081
Contract Number NObsr 43282

Date of Contract 27 January 1948
Date of Contract 18 May 1949

Serial Number of Equipment
Date of Acceptance by the Navy
Date of Delivery to Contract Destination
Date of Completion of Installation
Date Placed in Service

Blank spaces in this table shall be filled in at time of installation.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the Bureau of Ships in accordance with current regulations, using form NAVSHIPS NBS 383 (revised) except for Marine Corps equipment, in which case the "Signal Equipment Failure Report" form shall be used and distributed in accordance with instructions pertaining thereto. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the BUREAU OF SHIPS MANUAL or superseding instructions.

ORDERING PARTS

All requests or requisitions for replacement material should include the following data:

1. Standard Navy stock number or, when ordering from a Marine Corps or Signal Corps supply depot, the Signal Corps stock number.
2. Name and short description of part.

If the appropriate stock number is not available the following shall be specified:

1. Equipment model or type designation, circuit symbol, and item number.
2. Name of part and complete description.
3. Manufacturer's designation.
4. Contractor's drawing and part number.
5. JAN or Navy type number.

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the BUREAU OF SHIPS MANUAL or superseding instructions on the subject of radio-safety precautions to be observed.

The use of this equipment involves voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working on equipment employing high voltages.

While every practicable safety precaution has been incorporated in ship and shore electronic equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustment inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors.

To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE.

Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence of assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS.

Do not depend upon door switches or interlocks for protection, but always shut down motor generators or other power equipment. Under no circumstances should any access, gate, door, or safety interlock switch be removed, short-circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR, OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.



Figure 1-1. Tube Tester TV-3/U with Cover Removed

SECTION I

GENERAL DESCRIPTION

1. PURPOSE.

This handbook is intended for use with the Tube Tester TV-3/U (see Figure 1-1) described in the following paragraphs and contains information essential to the operation and maintenance of the equipment.

a. GENERAL.—The TV-3/U is a portable Tube Tester of the Dynamic Mutual Conductance type designed to test and measure the mutual conductance values of electron tubes of the receiving types and many of the smaller transmitting types. A Multimeter section, using the same indicator, is also incorporated in the equipment permitting measurements of ac and dc volts, dc mils, resistance and capacity in the ranges listed in paragraph 2j of this section. The entire equipment is enclosed in an aluminum carrying case with a built-in compartment for accessories and operating or running spare parts. The cover of the case is secured by means of two draw bolts. Two slip hinges permit the removal of the cover if desired. Two Instruction Sheets for the Tube Tester section and the Multimeter section are mounted on the inside surface of the cover for ready reference. A suitable carrying handle is provided.

2. REFERENCE DATA.

- a. Nomenclature:* Tube Tester TV-3/U.
- b. Contract Number:* NObsr-42081 and NObsr-43282.
- c. Contractor:* The Hickok Electrical Instrument Co.
- d. Cognizant Naval Inspector:* Inspector of Naval Material, Cleveland, Ohio.
- e. Number of Packages Involved per Complete Shipment of One Equipment Including Equipment Spare Parts:* One.
- f. Total Cubical Contents Including Equipment Spares:*

Crated:
Uncrated:

g. Total Weight Including Equipment Spares:

Crated:

Uncrated:

b. Characteristics of Power Supply Required for Operation: 105 to 125 Volts ac at 50 to 1600 Cycles, Single Phase. 50 Watts Min. at 60 cycles.

i. Current Drain: 0.33 Amps.

j. Meter Ranges:

(1) Micromhos: 0 to 3000,
0 to 6000,
0 to 15,000.

(2) A.C. and D.C. Volts: 0 to 20,
0 to 200,
0 to 500,
0 to 1000.

Sensitivity on all ranges 1000 ohms per volt.

(3) D.C. Milliamperes: 0 to 20,
0 to 200.

(4) Resistance: 0 to 1 Megohm,
0 to 100 Megohms.

(5) Capacity: 0 to 5 Microfarads,
0 to 50 Microfarads.

k. Accuracy:

(1) D.C. Ranges: Plus-minus 3% of full scale deflection at temperatures between plus 10° and plus 25° C.; Plus-minus 5% of full scale deflection at temperatures between 0 and 50° C.

(2) A.C. Ranges: Plus-minus 5% of full scale deflection between plus 10° and plus 25° C.; Plus-minus 6% of full scale deflection between 0 and 50° C.

(3) Resistance Ranges: Plus-minus 5% at mid scale values at normal room temperatures, approx. 20° C.

(4) Micromhos: Plus or minus 10% on all ranges.

3. EQUIPMENT LISTS.

TABLE 1-1. EQUIPMENT SUPPLIED

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

| QUANTITY | NAME OF UNIT | REQUIRED CHARACTERISTICS |
|----------|-------------------|--|
| 1 | A.C. Power Source | Capable of supplying 50 to 1600 cycles, 115 Volts p/m 10% A.C., single phase, 50 watts. |

4. VACUUM TUBE COMPLEMENT.

The Tube Tester TV-3/U requires one each of the following type vacuum tubes for operation:

| ELECTRON TUBE TYPE | QUANTITY |
|--------------------|----------|
| JAN-5Y3GT | 1 |
| JAN-83 | 1 |

5. ACCESSORIES.

TABLE 1-3. ACCESSORIES AND OPERATING SPARES SUPPLIED

| QUANTITY | DESCRIPTION | SYMBOL DESIGNATION |
|----------|--|--------------------|
| 1 | LEAD; Grid and Plate, for Lighthouse Tubes | W-101 |
| 1 | LEAD; Capacity Test | W-102 |
| 1 | LEAD; Plate Connector | W-103 |
| 1 | LEAD; Red Test Prod for Multimeter | W-104 |
| 1 | LEAD; Black Test Prod for Multimeter | W-105 |
| 1 | LEAD; Grid Connector | W-106 |
| 1 | PILOT LAMP | E-101 |
| 2 | FUSE LAMPS | E-102 |
| 1 | NEON LAMP | E-103 |

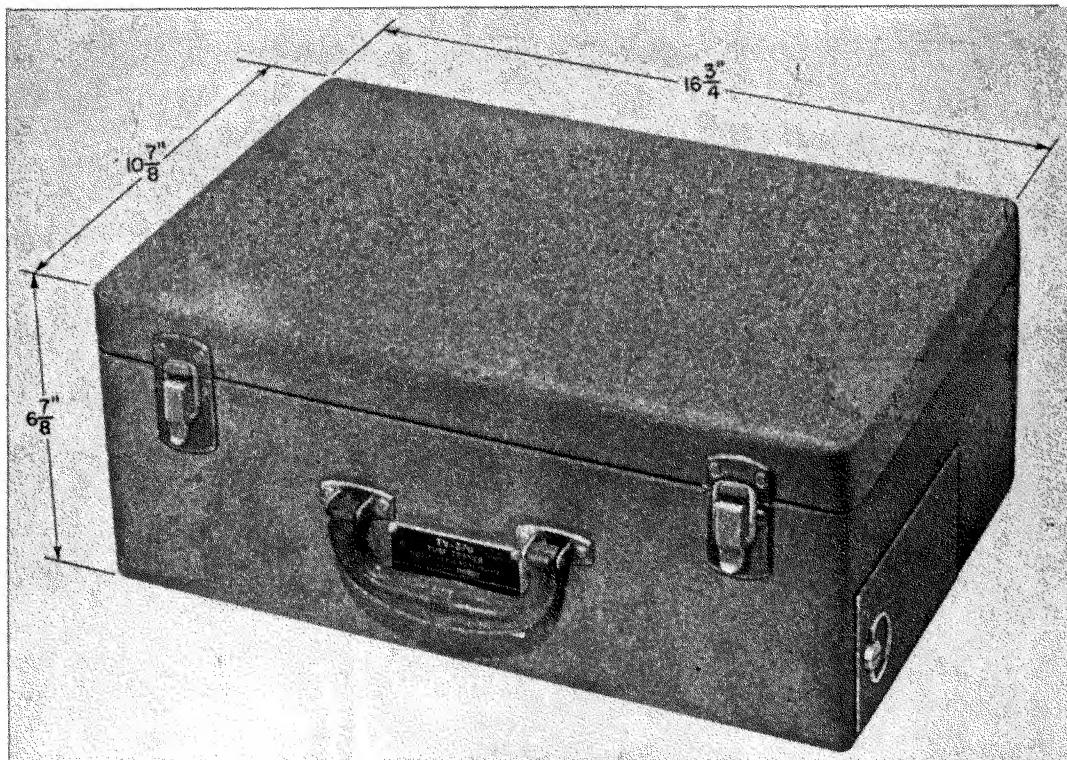
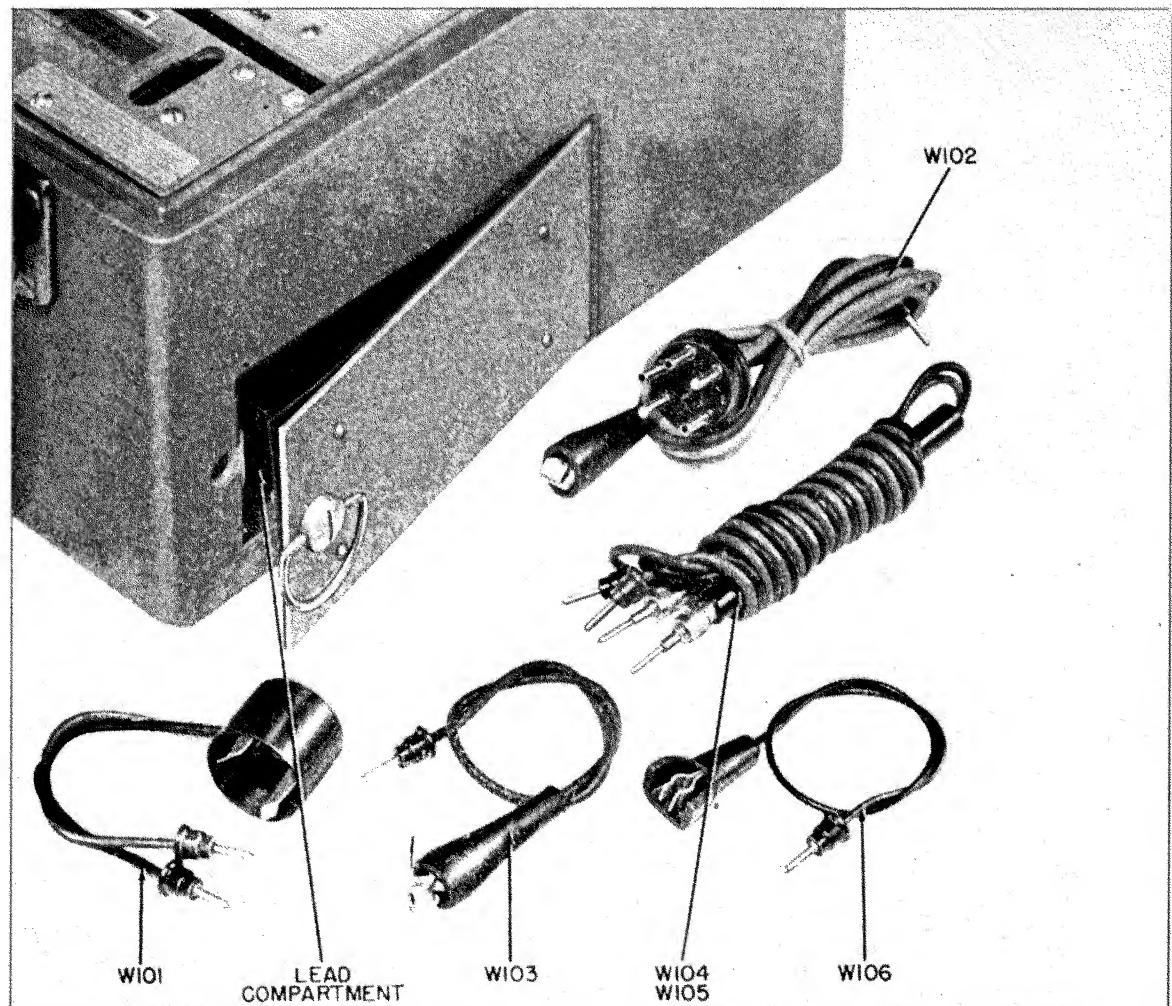


Figure 1-2. Tube Tester TV-3/U with Cover Closed



**READ INSTRUCTIONS
CAREFULLY BEFORE
ATTEMPTING TO
OPERATE THIS
EQUIPMENT**

SECTION 2

THEORY OF OPERATION

1. TUBE TESTER REQUIREMENTS.

a. Electron tubes supplied to the Armed Forces are in nearly all cases procured under either JAN Specifications or other military specifications, which impose rigid controls on the processes of manufacturing, handling, and transportation of the tubes to insure delivery of the highest possible quality tubes to the Services.

b. It is necessary, however, to provide some means of determining the condition of new replacement tubes and also the condition of tubes which have been in service for some time.

c. Of the several methods employed for testing electron tubes, the Dynamic Mutual Conductance or Transconductance test is recognized as the most accurate means available without resorting to the use of complex and cumbersome laboratory equipment. This tube tester, therefore, employs the Dynamic Mutual Conductance test method, and the mutual conductance of the tube under test is indicated on the meter scale directly in micromhos.

Note

The terms mutual conductance and transconductance are used interchangeably. Either term may be defined as the ratio of a small change in plate current to the corresponding change in control grid voltage which produced it. Values of mutual conductance are expressed in Micromhos. The symbol G_m is used to represent mutual conductance or transconductance in various mathematical representations of tube characteristics and their relationships.

d. In addition to the mutual conductance test it is essential that the tube tester provide adequate means of testing for shorted elements and excessive gas content.

e. In the case of tubes of the diode type, tubes having no grid, a straight emission test must be employed rather than the mutual conductance test.

f. Some means of adjusting the voltage input to the Tube tester must be provided to maintain the proper test potentials at all elements under varying conditions of line voltage.

2. THEORY OF OPERATION OF TUBE TESTER SECTION.

(See Figures 2-1 and 2-2)

a. Examine first the simple full-wave rectifier circuit shown in Figure 2-1. The two power transformer secondary windings have their inner ends connected to a direct-current milliammeter. Across the milliammeter is a center-tapped resistor R_M . The load is shown as a resistance R_L , connected between the center tap and the rectifier filament as in any full-wave rectifier circuit.

When rectifier plate P_2 is positive, electron flow is through the upper half of R_M , and the meter tends to deflect in one direction. When P_1 is positive, electron flow is through the lower half of R_M , and the meter tends to deflect in the other direction. With the load resistance fixed and equal forces acting on the meter in both cases, the meter stays at zero because it cannot follow variations at the power line frequency.

b. If the electron tube to be tested is substituted for the fixed load resistance, and a fixed bias E is applied to the tube as in Figure 2-2, the meter will still read zero because an electron tube under steady-state conditions acts like a fixed resistance.

c. If an ac potential is applied to the grid of the tube under test in addition to the dc bias, the circuit becomes equivalent to that employed for quality and mutual conductance tests in Tube Tester TV-3/U. When this ac potential swings the grid positive, the plate current of the tube is increased, and when the plate-cathode resistance is correspondingly lowered, more current flows through R_M and the deflecting force on the meter is greater than before. When the grid swings negative on the other half-cycle, the resistance of the tube under test is increased and the deflecting force on the meter is less. With unbalanced currents on adjacent half-cycles and consequent unequal forces on the meter, the meter reading becomes proportional to the difference in currents. Since this difference is created by the ac grid potential, the meter indicates the plate-current changes produced by the applied grid voltage change, or in other words, the meter indicates mutual conductance.

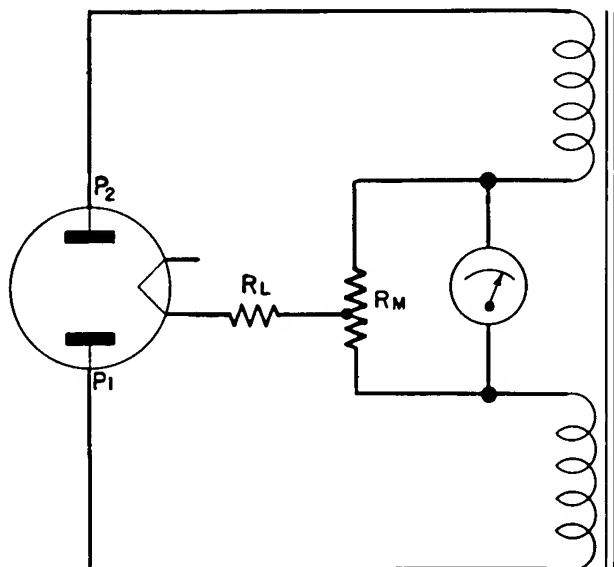


Figure 2-1. Rectifier Diagram
Illustrating Theory

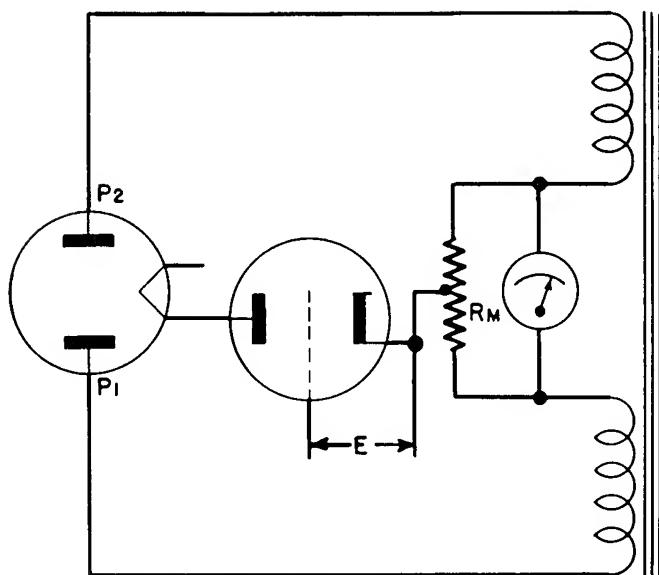


Figure 2-2. Basic Mutual Conductance Circuit Illustrating Theory

3. POWER SUPPLY.

(See Figure 2-3 opposite page)

a. The power transformer, T101, is supplied with primary voltage from a 105 to 125 volt 50 to 1600 cycle line through power ON-OFF switch S106, LINE ADJUST control R113, and FUSE lamp E102. The LINE ADJUST control, when operated in conjunction with the line test circuit, standardizes the voltage across the primary of T101 at 93 volts.

b. Secondary #1 of power transformer T101 consists of a multi-tapped winding designed to supply the various filament or heater voltages for the tubes under test. Voltages shown on Figure 2-3 are measured under load. No load voltages will be somewhat higher. For example; no load voltage measured from point (H) to point (I) will be approximately 124 volts with 93 volts on the primary. Secondary #1 also supplies voltage for rectifier emission tests.

c. Secondaries #2 and #3 supply approximately 170 volts ac to the plates of the type 83 tube V101, which supplies plate voltage to the tube under test. Secondary #2 is also tapped at 20 volts to supply voltage for diode emission tests.

d. Secondary #4, a center tapped 5 volt winding, supplies filament voltage for the type 83 rectifier tube V101.

e. Secondary #5 supplies the signal voltage for mutual conductance tests, 5 volts ac.

f. Secondary #6, 320 volts center tapped, supplies the plates of the screen voltage rectifier V102, a type 5Y3GT tube, a voltage divider system, R113, R114, R115, BIAS control R116, and adjustable resistor R118 across, the output of V102 provides the bias voltage for mutual conductance tests.

g. Secondary #7, 5 volts center tapped, supplies the filament of the type 5Y3 tube, V102.

4. LINE VOLTAGE TEST.

(See Figure 2-4)

a. Pressing the LINE ADJ. push button P7 connects the METER, M101, through resistor R101 and copper oxide rectifier CR 101 to points (H) and (I) of the power supply (Figure 2-3).

b. The values of R101 in series with the meter and R131 and R133 in shunt are such that 124 volts rms across (H) and (I) of the power supply will cause the METER M101 to read 100 volts or LINE TEST.

c. The design of the power transformer T101 is such that 93 volts applied to the primary winding will induce 124 volts across the total secondary #2 winding or across points (H) and (I).

d. Therefore, if, with the LINE ADJ. push button P7 pressed down, the LINE ADJUST CONTROL R113 is turned until the pointer of the METER, M101, is exactly over the LINE TEST mark a standard voltage of 93 volts rms will be established across the primary winding of T101.

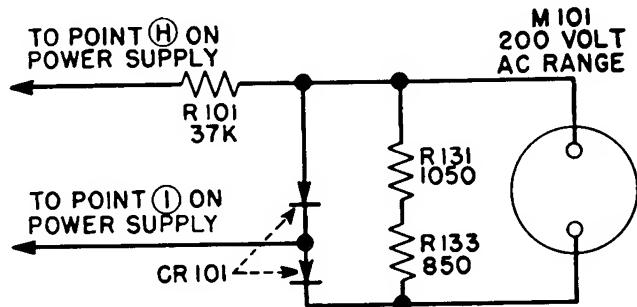


Figure 2-4. Simplified Line Voltage Test Circuit

5. SHORT TEST.

(See Figure 2-5)

a. An ac potential of 93 volts rms from the primary of T101 is applied to the short test circuit through capacitor C105 and resistor R134. The neon lamp, E103, shunted by resistor R129 is connected in series with R134.

b. Turning the SHORTS test switch S113 through position 1, 2, 3, 4, and 5 connects the various elements of the tube under test between the neon lamp E103 and capacitor C105. The SELECTORS must, of course, be set correctly for the particular tube. Any shorts between the elements will complete the circuit from capacitor C105 to the neon lamp E103 causing it to glow.

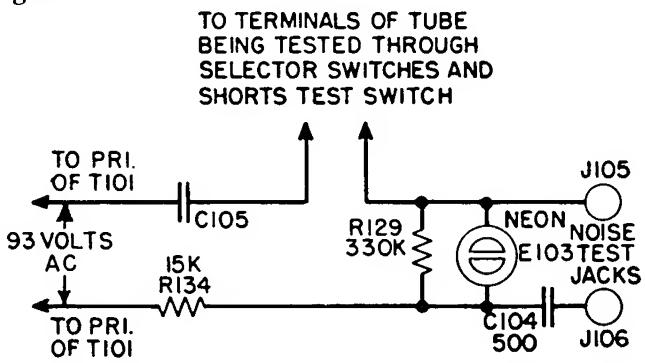


Figure 2-5. Simplified Short Test Circuit

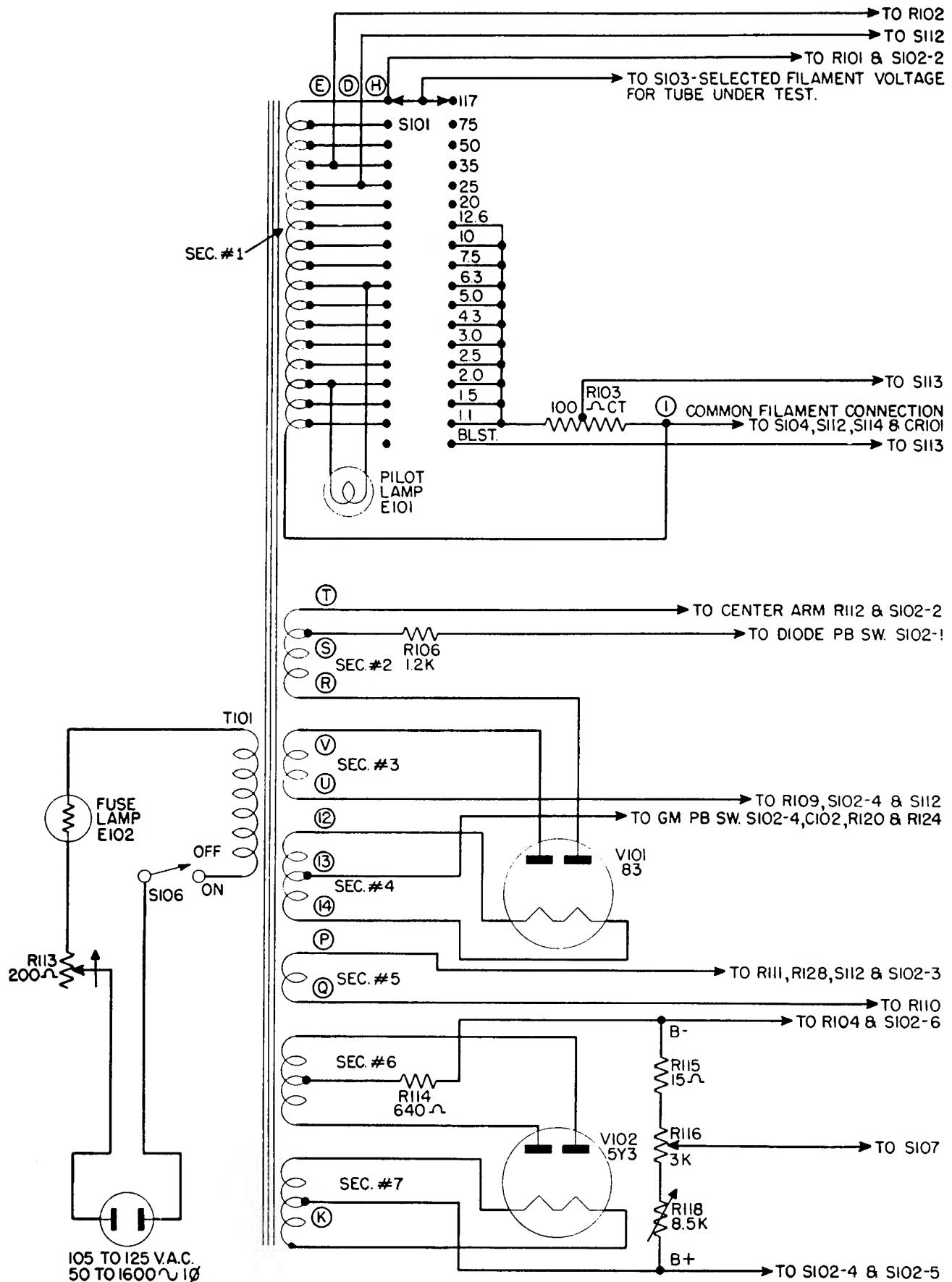


Figure 2-3. Simplified Power Supply Circuit

6. NOISE TEST.

(See Figure 2-5)

a. The short test circuit may also be used for making a noise test of electron tubes.

b. Connect the NOISE TEST jacks, J106 and J107, to the antenna and ground posts of any radio receiver.

c. Turn the SHORTS test switch S113 through positions 1, 2, 3, 4, and 5, meanwhile tapping the tube under test with a finger, or the eraser on a pencil. Intermittent disturbances between the electrodes too brief to register on the neon lamp will cause a momentary short, permitting the alternating voltage from the power supply to be applied to the neon lamp causing a brief oscillation. This oscillation will be reproduced by the loud speaker or headphones as an audible signal similar to static.

7. RECTIFIER TEST.

(See Figure 2-6)

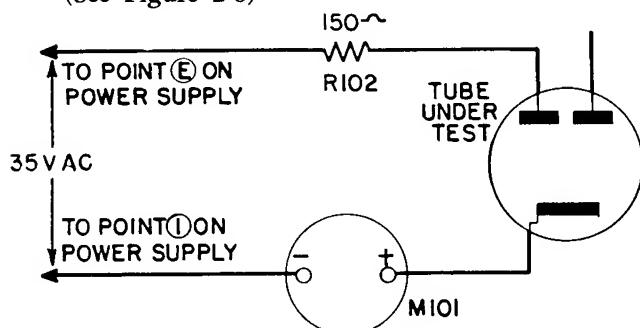


Figure 2-6. Simplified Rectifier Test Circuit

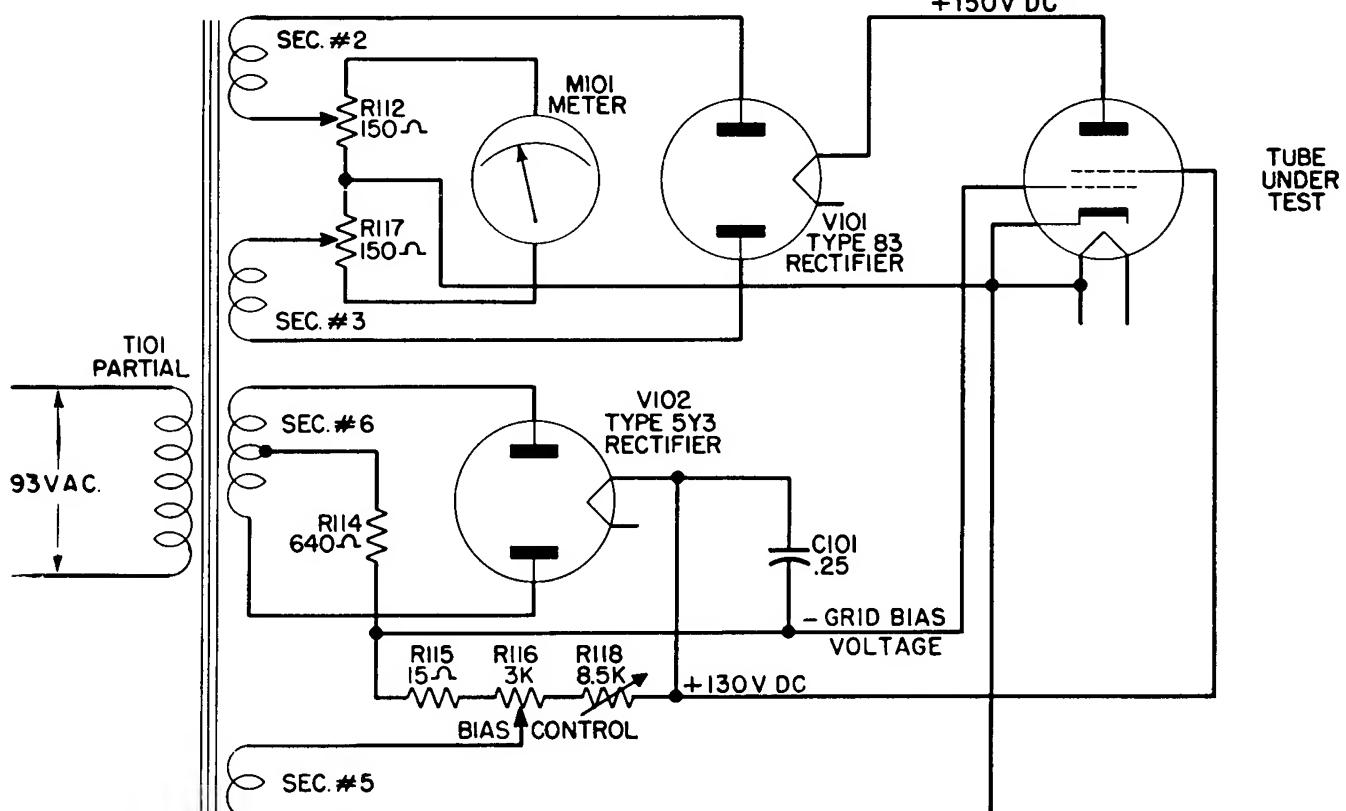


Figure 2-7. Simplified Mutual Conductance Test Circuit

a. Rectifier tubes and diode detector tubes can only be tested for emission. The test circuit is therefore quite simple.

b. Pressing RECTIFIER push button P3 applies an ac potential of 35 volts which is applied between the cathode and plate of the tube under test through resistor R102, and the METER, M101, causing the tube to rectify.

c. The rectifying action of the tube under test will cause a direct current to flow through the meter. Since the current indicated by the meter is proportional to the electron emission of the tube, the meter reading may be taken as a measure of the tube's efficiency.

d. A line on the meter scale marked RECTIFIER OK indicates the point above which rectifier tubes are considered satisfactory. Tubes reading below this line should be rejected.

e. Pressing the OZ4 push button P2 sets up a circuit similar to Figure 2-6, but a higher voltage is applied, 287 volts ac.

f. Pressing the DIODE push button P1 also establishes a circuit similar to Figure 2-6, but a lower voltage, 20 volts ac, is used to protect the delicate cathodes of these tubes.

8. MUTUAL CONDUCTANCE.

(See Figure 2-7)

a. The mutual conductance (g_m) of an amplifier-type vacuum tube, also called the grid-plate transconductance, is an expression representing the efficiency of

performance of a tube as indicated by the *change in plate current* (ΔI_p) divided by the *change in grid voltage* (ΔE_g). The relation is generally written $G_m = i_p / \Delta E_g$. The value is expressed in micromhos and is a performance indication because it shows how effective a tube is in converting a small change in grid voltage (grid signal) to a large change in plate current.

b. For the measurement of the mutual conductance value directly, the proper dc grid voltage for the tube under test is supplied by a full-wave rectifier circuit using a 5Y3G, V102 tube. Setting BIAS control potentiometer R116 at the value called for on the test data roll chart adjusts this negative bias voltage to the correct value for the particular tube under test.

c. Alternating voltages of 5 volts rms from a separate secondary winding on the power transformer, T101, or 1 volt rms from a voltage divider consisting of R110 and R111, act in series with the grid bias as required for this type of test. This voltage alternately swings the grid in positive and negative directions from the dc bias value, thereby producing the grid-voltage (ΔE_g) required for a dynamic test.

d. The plate voltage for the tube under test is supplied by another full-wave rectifier circuit, using a type 83 tube, V101. The return lead contains the meter circuit which serves to measure the plate-current change (ΔI_p). The meter circuit consists essentially of dual potentiometer R112 and R117 shunted across the METER, M101. Points on the dial I102 of this dual potentiometer serve to adjust the potentiometer for the three ranges of micromhos 3000-6000-15,000 for NORMAL HIGH SIGNAL (5 volts), and two ranges, 6000 and 15,000, for LOW SIGNAL (1 volt).

9. GAS TEST.

(See Figure 2-8)

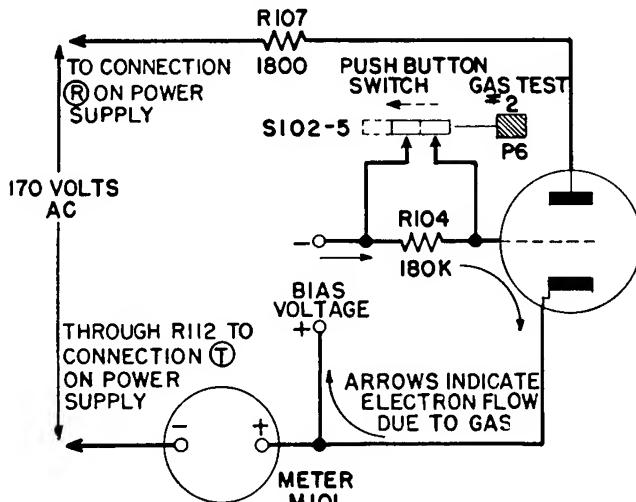


Figure 2-8. Simplified Gas Test Circuit

a. Pressing GAS-1 push button P5 applies definite values of plate voltage and grid bias voltage to the tube under test, causing a definite value of plate current to flow. This current is indicated on the METER, M101.

b. Pressing GAS-2 push button P6 inserts a 180,000 ohms resistor, R104, in the grid circuit. If grid current is flowing from the bias voltage source through the grid circuit to the cathode due to gas in the tube, this current will develop a voltage drop across resistor R104. This voltage drop will reduce the negative bias on the grid, causing a corresponding increase in the plate current being measured by the METER, M101.

c. If the tube contains gas the pointer of the meter will move up scale. This increase in meter reading should not exceed one scale division.

10. ANALYZER SECTION.

a. Volts A.C. and D.C. (See Figure 2-9)

(1) The voltmeter circuit consists of the METER, M101, shunted by resistors R131 and R133, with a

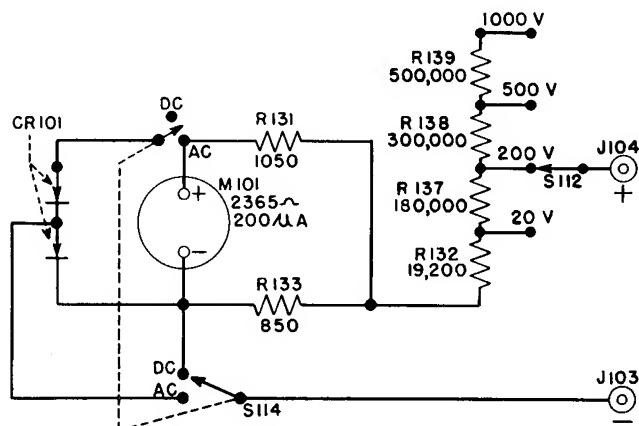


Figure 2-9. Simplified Voltmeter Circuit

network of series resistors R132-R137-R138-R139 connected to the point where R131 and R133 are joined.

(2) The MASTER switch S112 connects the jack J104 to the proper tap of the series resistors for the voltmeter range selected.

(3) For ac volts, the copper oxide rectifier CR101 is connected into the voltmeter circuit, by operating the switch S114 to the proper position.

b. OHMS X1 and X100. (See Figures 2-10 and 2-11)

(1) The ohmmeter section consists of two ranges, ohms X1 and ohms X100. Each has a voltage divider network selected by the MASTER SWITCH S112, which also connects the meter across part of the voltage divider, so that it reads INF. or full scale when a standard voltage is applied by setting LINE ADJUST control R113.

(2) The unknown resistance is connected to the test jacks J103 and J104, which parallels part of the divider network, changing the effective resistance of the divider.

(3) The meter scale indicates ohms directly.

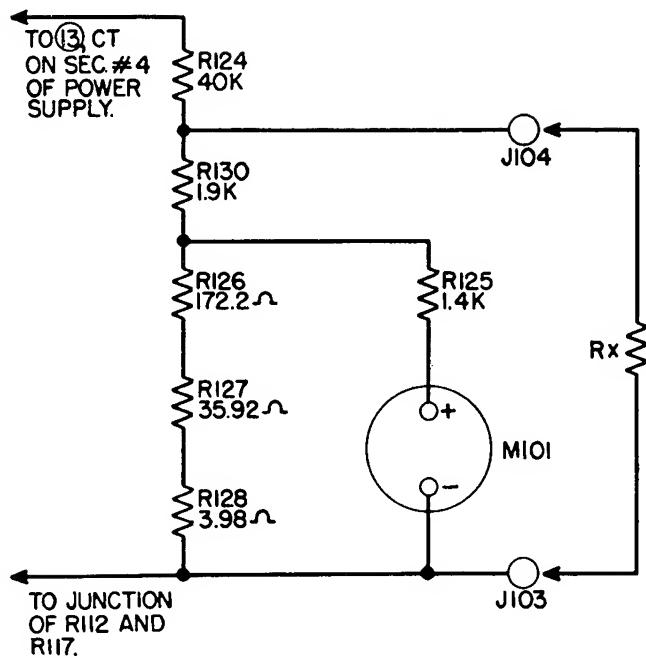


Figure 2-10. Simplified Ohmmeter Circuit for Ohms X1 Range

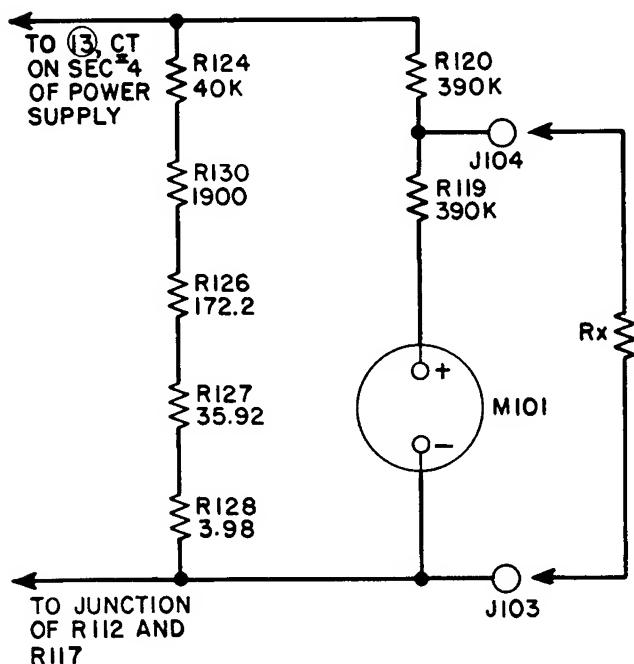


Figure 2-11. Simplified Ohmmeter Circuit for Ohms X100 Range

c. CAPACITY. (See Figure 2-12)

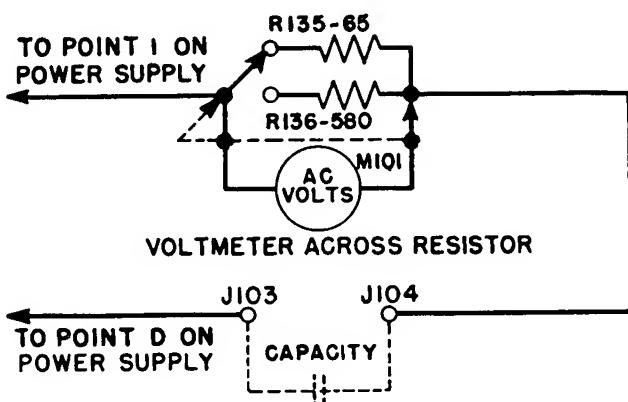


Figure 2-12. Simplified Capacity Test Circuit

(1) A standard ac voltage is applied across the capacitor connected to J103 and J104, through resistor R135 or R136, depending on the range selected by MASTER switch S112.

(2) The voltage drop across the series resistor, either R135 or R136, is measured by the meter, which is calibrated directly in microfarads.

d. MILLIAMPERES. (See Figure 2-13)

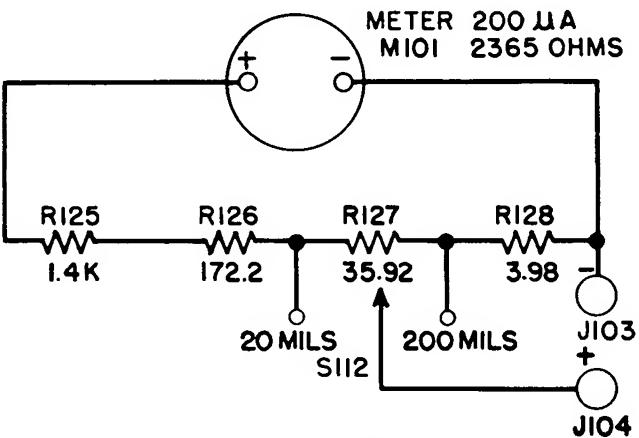


Figure 2-13. Simplified Milliammeter Circuit

(1) The milliammeter, as shown in Figure 2-13 is of the conventional type and will measure up to 200 mils in two ranges, 0-20 and 0-200.

(2) To avoid possible damage to the meter always use the highest range first.

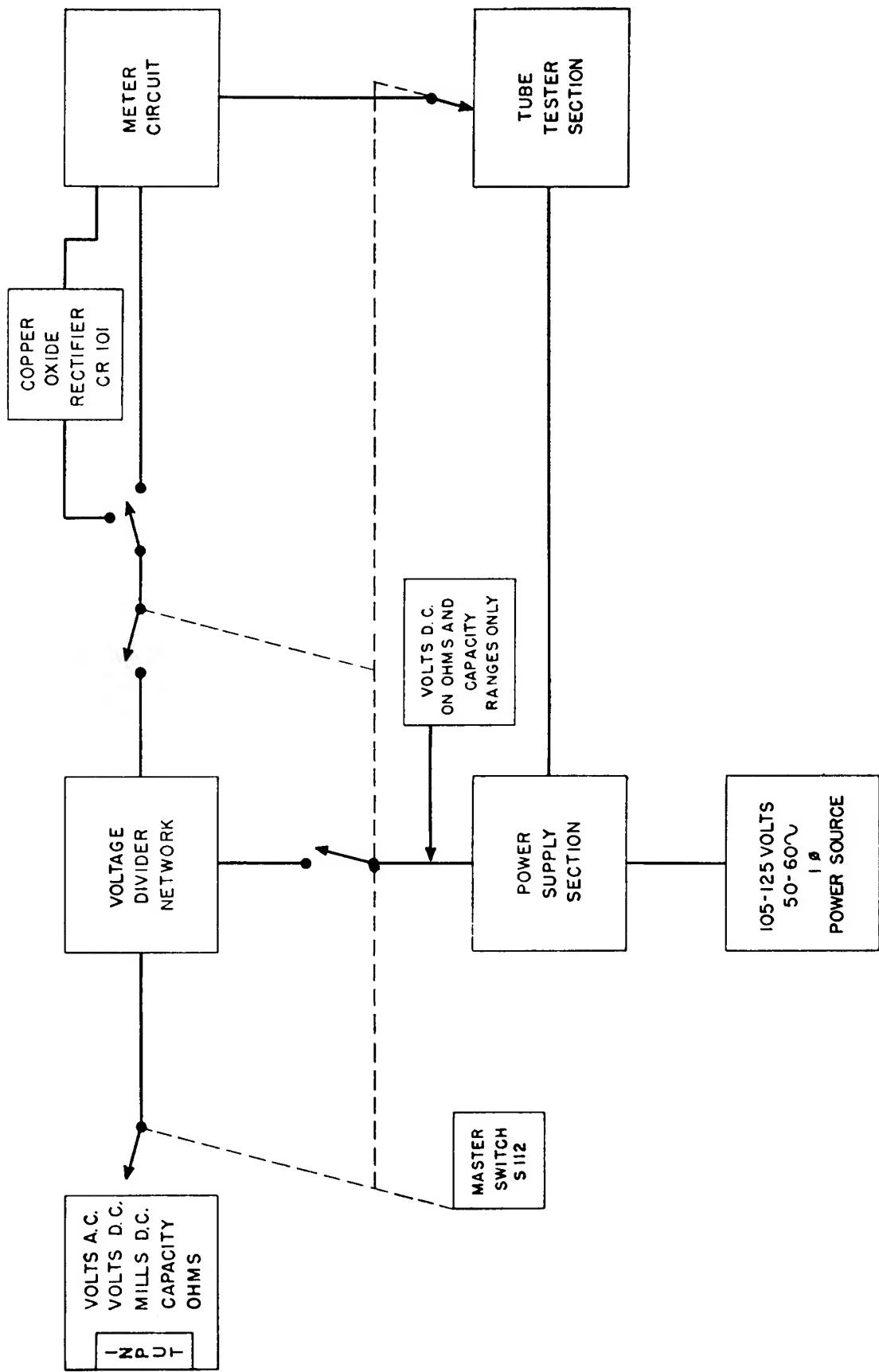


Figure 2-14. Basic Block Diagram of Tube Tester TV-3/U

SECTION 3

INSTALLATION AND INITIAL ADJUSTMENTS

1. TUBE TESTER SECTION.

- a.* After carefully removing the Tube Tester TV-3 U from its shipping container, set the Tester up near a 105 to 125 volt 50-60 cycle ac outlet.
- b.* Open the cover and uncoil the line cord. Check the FUSE lamp E102 and the neon lamp E103 to make sure they are properly seated in their sockets.
- c.* Open the lead compartment in the end of the case and check the lead complement using Table 1-3 and Figure 1-3. In addition to the leads, a set of operating spares consisting of two FUSE lamps, one neon lamp, and one pilot lamp is also housed in this compartment.

d. Plug the line cord into a 105 to 125 volt 50-60 cycle ac outlet, and throw the line switch S106 to the ON position. The red panel indicator I101 should light. If it does not, unscrew the red jewel cover of indicator I101 and make sure that the pilot lamp E102 is properly seated in its socket. Should the indicator still fail to light, check pilot lamp E102 and the FUSE lamp E101 for open filaments; and, if necessary, replace from operating spares which will be found in the lead compartment.

e. Press the LINE ADJ. button P7 and be sure that the pointer of meter M101 can be set to LINE TEST

by turning the LINE ADJUST knob. If this adjustment can be accomplished, the tube tester section is ready for operation.

2. ANALYZER SECTION.

- a.* With the line cord connected to a 105 to 125 volt 50 to 1600 cycle ac source and the line switch S106 in the ON position, turn the master switch S112 to the OHMS X1 position.
- b.* The pointer of the meter M101 will move up scale to the right.
- c.* Turn LINE ADJUST knob of R113 until the pointer rests exactly over the end of the scale marked INF. (infinity).
- d.* Insert the red and black Test leads W104 and W105 in the VOLTS-MILS-OHMS-CAP. jacks at the upper right hand corner of the panel.
- e.* Short the ends of the test leads together. This should cause the pointer of the meter to return to zero.
- f.* Repeat the steps outlined in paragraphs 2a through 2e above for OHMS X100, CAP. 5 MFD and CAP. 50 MFD settings of master switch S112.
- g.* If proper meter indications and adjustments, as in steps "a" through "e" above, are obtained on these four ranges, the analyzer section is ready for operation.

SECTION 4**OPERATION**

IMPORTANT: Read these instructions thoroughly before attempting to operate the Tube Tester TV-3/U.

1. GENERAL.

a. Refer to the photograph of the Model TV-3/U, Figure 4-1, or preferably to the *tester itself*.

(1) The tube sockets are grouped along the top edge and in the upper left hand section of the panel as follows. Along the top edge reading from left to right are standard sockets for 4-5-6 pin tubes, a dual socket for large and small radius 7 pin tubes, which also provides a pilot lamp test receptacle, an 8 pin octal socket, and an 8 pin loctal socket. A 7 pin miniature socket and a 9 pin, or noval miniature, are located directly below the 4 and 5 pin standard sockets respectively. An acorn tube socket designed to accommodate all tubes of this type now in use is located directly below the 6 pin socket. An 8 contact subminiature socket is located to the left of the 7 pin miniature socket.

(2) For tubes having top grid connections, top plate connections, or both, use grid and plate leads, W106 and W103, Figure 1-3. For lighthouse type tubes use W101, Figure 1-3.

(3) Leads supplied for use with the analyzer section are also illustrated in Figure 1-3. They are red and black test leads 48" long, W104 and W105 for VOLTS-MILS-OHMS and capacity measurements, and W102, a special lead for checking small capacitors from .0001 to .05 M.F.

(4) All leads referred to in the preceding paragraphs are kept in the lead compartment in the end of the case.

(5) The FUSE lamp serves both as a protective fuse and an overload indicator. This lamp will flash brightly when an overload is placed on the tube tester or the tube under test. When this occurs turn off the equipment immediately. A continued or excessive overload will, of course, burn out the FUSE lamp, and a replacement will be necessary. The red pilot lamp serves only as an ON-OFF indicator for the equipment.

2. THE CONTROLS.

a. Power input to the TV-3/U is controlled by the ON-OFF switch, S106.

b. The master switch S112, located in the upper right hand section of the panel, sets up the proper internal circuit connections for using the TV-3/U equipment for TUBE TEST, or for testing OHMS VOLTS (A.C. or D.C.) CAPACITY or MILS in the ranges provided.

c. The LINE ADJUST, R113, controls the input voltage to the power transformer, T101, for proper standardization of the tube tester section, and also the ohms and capacity circuits.

d. The FILAMENT *voltage* switch, S101, provides a selection of filament or heater voltages from 1.1 through 117 volts ac in seventeen steps. Another position on this switch, marked BLST., also provides for testing ballast tubes.

e. SELECTORS; FILAMENT S103, FILAMENT S104, GRID S105, PLATE S108, SCREEN S109, CATHODE S110, and SUPPRESSOR S115 provide proper switching of the internal circuits to apply correct test voltages to the various pins of the tube under test.

f. BIAS control R116 is used to adjust the bias voltage applied to the tube under test to the proper value.

g. SHUNT control, a dual potentiometer R112 and R117, controls the sensitivity of the meter circuit to the proper level for the tube under test.

h. SHORTS switch S113 has five short test positions which connect the various elements of the tube under test to the short test circuit containing the neon indicator lamp E103. A sixth switch position TUBE TEST connects the tube to the tube test circuits after short test is completed.

i. NORMAL—LOW SIGNAL switch S107 provides a selection of either 5 volts or 1 volt ac for exciting the grid of the tube to be tested.

j. Push button switches located in the center of the panel actuate the final circuit selector switches for the type of test to be made as follows:

(1) P1 DIODE, test button for low power diodes such as type 6H6.

(2) P2 OZ4, test button for cold cathode rectifiers such as type OZ4.

(3) P3 RECT., test button for rectifiers such as types 5Y3, 6X4, 83, etc.

(4) P4, RED test button. G_m or mutual conductance test button for testing amplifier tubes only. NEVER USE THIS BUTTON WHEN TESTING RECTIFIER TUBES.

(5) P5 and P6, No. 1 and No. 2 Gas test buttons.

(6) P7, test button for Line Adjust.

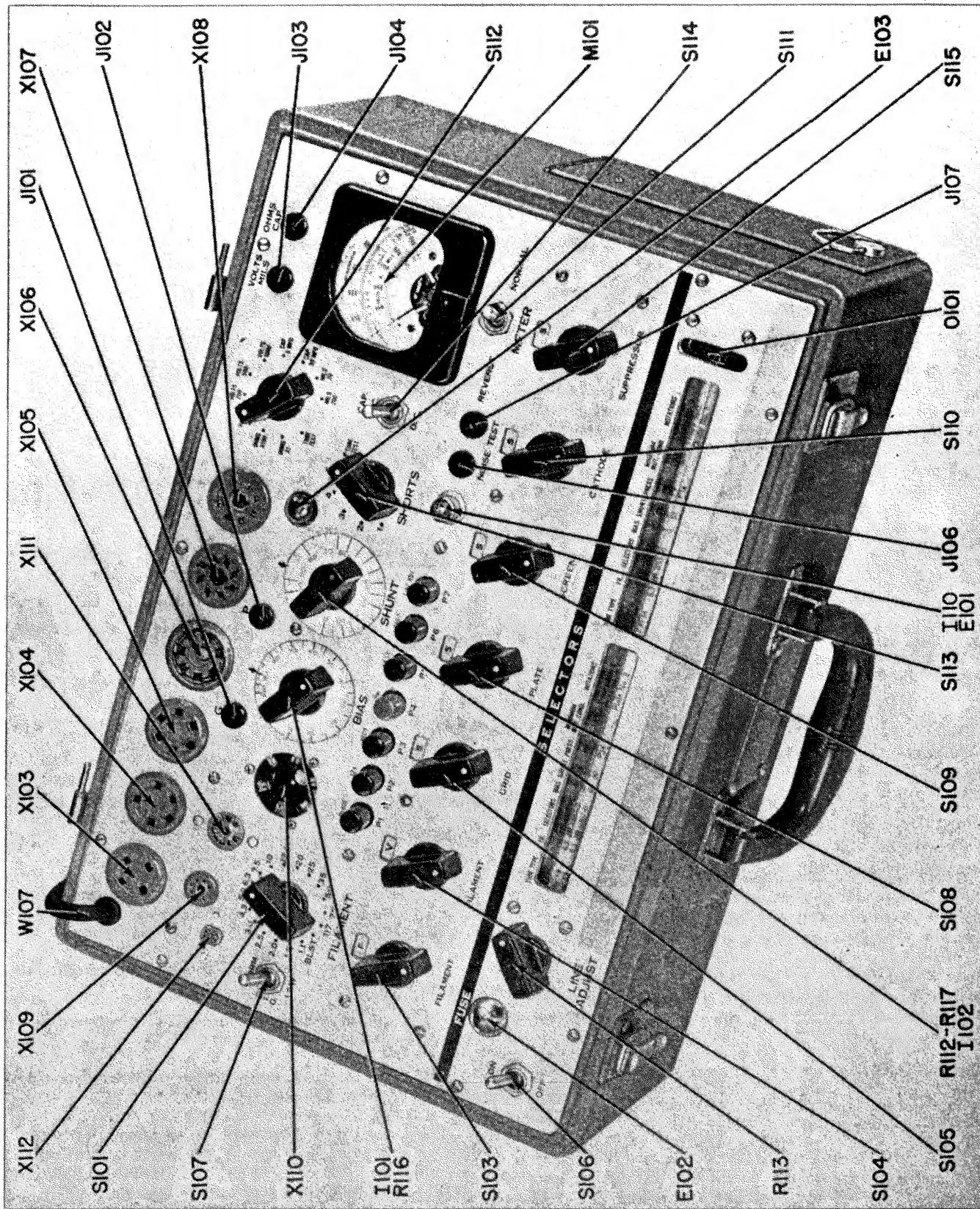


Figure 4-1. Front View of Tube Tester TV-3/U Showing Controls By Symbol Designation

k. CAP. A.C.-D.C. switch S114 connects copper oxide rectifier in analyzer circuit for A.C. volts and CAPACITY measurements only.

l. METER—REVERSE—NORMAL switch reverses polarity of voltage applied to meter when testing certain types of tubes.

m. Roller Index Chart I101, located at the bottom of the panel, is operated by a phenolic gear which protrudes through the panel in the lower right hand corner. Appropriate column headings on the panel just above the index window provide easy reference to tube test data printed on the roll chart.

3. TUBE TEST DATA.

a. All information necessary for properly setting the tube test controls for the various tube types is tabulated on the roll chart in eight columns under the following headings, reading from left to right:

(1) **TUBE TYPE:** All currently available type numbers which the TV-3/U is designed to test are listed numerically in this column starting with type OOA and continuing through type 38142. Tubes having type letters only instead of numbers, such as XXB, are listed at the end of the numerical listing.

(2) **FILAMENT:** Correct filament or heater voltages for the tube types listed are shown in this column. FILAMENT voltage switch S101 must be adjusted accordingly BEFORE inserting a tube in any of the test sockets.

(3) **SELECTORS:** In this column are listed the correct settings for the two FILAMENT selector switches, S103 and S104, GRID selector switch S105, PLATE selector S108, SCREEN selector S109, CATHODE selector S110, and SUPPRESSOR S115.

The settings follow the same order in which the switches appear on the panel reading from left to right.

(4) **BIAS:** This column lists the proper settings for the BIAS dial I101.

(5) **SHUNT:** This column lists special settings for SHUNT dial I102, and NORMAL—LOW SIGNAL switch S107. When no numerical setting is listed for this control on the Roll Chart, the dial should be set to the red dot marker for the micromhos range to be used.

(6) **PRESS:** Under this heading are listed the correct test PUSH BUTTONS to be used for the various tube types and their individual sections in the case of certain multipurpose tubes.

(7) **MUT. CON.:** In this column are the MINIMUM, not average, mutual conductance values for amplifier tubes and amplifier sections of multipurpose tubes. Any tube showing a G_m or mutual conductance reading less than the value indicated in this column should be discarded.

(8) **NOTATIONS:** Under this heading is listed special information pertaining to particular tube types.

b. The roll chart is divided into left and right hand sections. The left hand section covering the tube type numbers from 00A through 12AT6, and the right hand section covering type numbers from 12AT7 through type XXL.

c. All data shown on the roll chart is also contained in TABLE 4-2 of this section.

4. OPERATIONAL PROCEDURE.

a. When the TV-3/U is to be used as a Tube Tester—

(1) Plug the line cord W107 into an outlet supplying 105 to 125 volts ac at 50 to 1600 cycles.

(2) Throw the line toggle switch S106 to the ON position. The panel indicator I110 should light.

(3) Turn the MASTER SWITCH S112 to the position marked TUBE TEST.

(4) Press the LINE ADJ. Push Button, P7, which will cause the pointer of the METER, M101, to move up scale to the right.

(5) While still holding down Push Button P7, turn the knob of LINE ADJUST control R113 until the meter pointer rests exactly on the LINE TEST mark at the center of the meter scale. This establishes standard voltages for the tube tester.

Caution

DO NOT INSERT TUBE IN TEST SOCKET UNTIL CORRECT SETTINGS OF ALL CONTROLS HAVE BEEN MADE IN ACCORDANCE WITH THE FOLLOWING STEPS:

(6) Turn SHORTS switch S113 to position No. 1.

(7) Operate the phenolic gear which turns the roll chart mechanism until the type number of tube to be tested appears just above the red index line.

(8) Turn the knob of FILAMENT voltage switch S101 to the voltage indicated on the chart under FIL.

(9) Insert the tube to be tested in the proper test socket, and recheck line voltage adjustment as in paragraph (4) and (5) above.

(10) The SELECTORS: The operation of setting these seven dials is somewhat similar to dialing a telephone number. On the roll chart, below the word SELECTORS, are listed the dialing numbers. These numbers consist of two letters and five figures. It is only necessary to turn the knobs of the seven SELECTOR switches, FILAMENT, S103; FILAMENT, S104; GRID, S105; PLATE, S108; SCREEN, S109; CATHODE, S110; and SUPPRESSOR, S115, until the letters and numbers appearing in the small windows above the knobs are the same, reading from left to right, as those indicated on the roll chart.

EXAMPLE: The roll chart indicates JR-6237-5 under SELECTORS.

Starting at the left, turn the knob of the first FILAMENT SELECTOR switch S103 until the letter J appears in the window. Turn the second FILAMENT SELECTOR switch until the letter R appears in the window. Turn the GRID SELECTOR until the number 6 appears, the PLATE SELECTOR to number 2, SCREEN to number 3, CATHODE to number 7, and SUPPRESSOR to number 5.

The sequence of letters and numbers appearing in the windows should now be identical with those indicated on the roll chart. (JR-6237-5)

The seven SELECTORS are electrically interlocked in such a way that it is impossible to connect two different voltages to the same tube pin at the same time. Accidental shorts are thus avoided.

(11) Set the BIAS dial I101 to the point indicated on the roll chart under BIAS.

(12) Set the SHUNT dial I102, or the NORMAL-LOW switch S107, to the position indicated on the roll chart under SHUNT. If LOW SIGNAL is not indicated on the roll chart, the switch should be kept in the NORMAL position.

(13) IF THE TUBE IS OF THE HEATER CATHODE TYPE, ALLOW ENOUGH TIME FOR THE CATHODE TO REACH OPERATING TEMPERATURE BEFORE PROCEEDING.

(14) Turn the SHORTS switch S113 from position number 1 through position number 5, meanwhile watching the neon short indicator lamp E103 on each switch position. Tubes having shorted elements will cause the lamp to glow. Tubes may be tested either hot or cold. A short is indicated by a steady glow on both plates of the neon lamp. A momentary glow when the switch is turned from one position to another should be disregarded, as this flashing is caused by the charging of a condenser in the short test circuit.

Tubes having more than one section such as the 6J6 should be tested for shorts on each section.

A shorted tube should be discarded without further test.

(15) LOCATING SHORTED ELEMENTS. In the Table 4-1 (X) under any SHORT switch position indicates that the neon lamp glows in that position.

(16) If the tube passes the short test, turn the SHORTS switch S113 to the TUBE TEST position.

(17) Press the test push button indicated on the Roll Chart in the column headed PRESS.

P1 for DIODES.

P2 for OZ4 and similar rectifiers.

P3 for standard RECTIFIERS.

P4 for G_m , Mutual conductance, of amplifier tubes.

Table 4-1. Short Test Chart

| KIND OF SHORT | 1 | 2 | 3 | 4 | 5 |
|---------------|---|---|---|---|---|
| FIL —CATHODE | | | | X | |
| FIL —GRID | X | X | | | X |
| FIL —PLATE | X | X | | X | X |
| FIL —SCREEN | X | | X | X | X |
| FIL —SUP | | X | | | |
| GRID —CATHODE | X | X | X | | X |
| GRID —PLATE | | | | X | |
| GRID —SCREEN | | X | X | X | |
| GRID —SUP | X | | | | X |
| PLATE —SCREEN | | X | X | | |
| PLATE —SUP | X | | | X | X |
| SCREEN —SUP | X | X | X | X | X |

(18) With the proper test push switch depressed, the METER M101 will indicate the condition of the tube.

(19) RECTIFIER TUBE TEST: Rectifier tubes, including diode tubes and diode sections of multi-purpose tubes, are tested for emission only since they have no mutual conductance characteristic.

Caution

NEVER press the RED G_m , mutual conductance push button P4 when testing rectifier tubes.

(a) The push button P1 is used when testing detector DIODES. It applies a low voltage which will not injure the delicate cathode. Good diodes will cause the pointer of METER M101 to indicate above the point marked DIODES OK.

(b) The push button P2 is used when checking cold cathode rectifiers such as the OZ4. This applies a voltage sufficiently high to ionize the tube and start conduction. Good tubes will cause the pointer of METER M101 to indicate above the point in the center of the scale marked RECTIFIERS OK.

(c) The push button P3 is used when testing regular power rectifiers such as the 5Y3. Depressing this button applies a medium voltage which is best suited to reveal defects in this type of tube. Good tubes will read above the point at the center of the scale marked RECTIFIERS OK.

(d) For multi-section tubes having more than one diode section, or for full wave power rectifiers, each section must be tested separately as indicated on the Roll Chart.

(20) MUTUAL CONDUCTANCE TEST: In the case of amplifier tubes an emission test is not sufficient, and a mutual conductance test must be employed. Be sure that the controls are properly set in accordance with the Roll Chart as outlined in paragraphs 4a (6)

through 4a (12) of this section, and also that the tube has been checked for shorts in accordance with paragraphs 4a (13)-(14) of this section. Then turn the SHORTS switch S113 to the TUBE TEST position.

(a) The mutual conductance is measured in micromhos in five ranges:

0 to 3,000 with NORMAL HIGH SIGNAL voltage

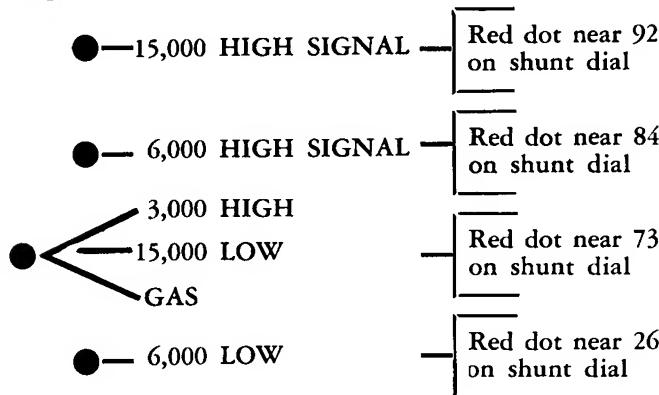
0 to 6,000 with NORMAL HIGH SIGNAL voltage

0 to 15,000 with NORMAL HIGH SIGNAL voltage

0 to 6,000 with LOW SIGNAL voltage

0 to 15,000 with LOW SIGNAL voltage

(b) Four small red dots on the edge of the SHUNT dial indicate the proper setting for this dial to obtain proper readings in micromhos for the various ranges, also shown on the dial.



(c) The column headed SHUNT on the Roll Chart indicates the tubes for which the SIGNAL switch S107 should be set to the LOW position. On all other tubes it should be set to the NORMAL HIGH position.

(d) The LOW SIGNAL voltage is used with certain tubes having low bias and sharp cutoff characteristics to prevent swinging the grid from positive to cutoff. This results in a more accurate test.

(e) With the NORMAL-LOW SIGNAL switch in the proper position, determined as above, set the SHUNT dial I102 to the range which most closely agrees with the minimum mutual conductance value shown under G_m on the Roll Chart for the tube under test. Correct settings for the ranges are indicated by four red marker dots.

(f) Check the line adjustment as in paragraph 4a (4) and 4a (5) of this section, and reset LINE ADJUST R113 if necessary.

(g) Press G_m push button P4. The METER M101 will indicate the mutual conductance or G_m of the tube directly in micromhos on the scale corresponding to the range selected when setting the SHUNT dial I102. That is, 0 to 3,000, 0 to 6,000, or 0 to 15,000 for

NORMAL HIGH SIGNAL; and 0 to 6,000, or 0 to 15,000 for LOW SIGNAL.

(h) Check the mutual conductance in micromhos as indicated on the METER M101 with the value shown on the Roll Chart. Since the chart values are MINIMUM any tube which reads below this value should be discarded or replaced.

(21) GAS TEST. The push switches P5 and P6 are used to test an amplifier tube for gas content.

(a) Set the SHUNT dial at RED DOT, NEAR 73 MARKED GAS.

(b) The push button P5 is pressed and held down while the BIAS dial is turned to cause the pointer of the meter to indicate 100 micromhos on the 0-3000 scale.

(c) Hold down the P5 and press P6.

(d) If the tube contains gas the pointer of the meter will move UP the scale. If the pointer movement is not more than one division of the scale, the gas content is satisfactory.

Note

With some tubes, such as the type 45, the micromhos reading cannot be brought down to 100 mhos by turning the BIAS dial. In such case turn the BIAS dial to 100 and test for gas.

(e) Some tubes develop gas after being heated for a period of time. If a tube is suspected, allow it to heat for a few minutes.

(22) METER REVERSE. Directly below the indicating meter is a switch S111 marked REVERSE-NORMAL. With certain tubes, such as the 117N7, the meter, when this switch is set on NORMAL, will deflect backwards (to the left) when push switch P3 is pressed for rectifier test. In such case turn the meter switch to REVERSE, which will cause the pointer of the meter to move up the scale. The TUBE TEST DATA CHART indicates when S111 should be set in reverse by a note "REVERSE METER" in the column headed "NOTATIONS." After the test has been made return the switch to NORMAL.

(23) TOP CAPS. There are two jacks in the upper center of the control panel marked G(grid) J101 and P(plate) J102. These are used when making connection to the top cap of the tube being tested. On the data chart in the NOTATIONS columns, opposite tube types having top caps, is the notation CAP = G or CAP = P. G means that the top cap is connected to the G jack, and P that it is connected to the P jack. Test leads W103 and W106 are used in making these connections.

(24) NOISE TEST. The short test circuit is also used in making noise tests on electron tubes. Connections are made from the noise test jacks J105 and J106 to the antenna and ground posts of any radio receiver. The tube under test is tapped with the finger as the

SHORTS switch S113 is turned through positions 1-2-3-4-5. Intermittent disturbances, which are too brief to register on the neon lamp, will be reproduced by the loud speaker as static.

(25) PILOT LAMP TEST. The center of the large 7-pin socket is used to check pilot lamps. Set the filament selector switches on JR. Set the filament voltage switch to the proper voltage for the lamp being tested.

(26) SOCKET NUMBERING. In order to reduce dialing to a minimum the socket contacts are numbered as shown on Figure 4-2 which shows the bottom views. The numerical values of the lettered dials are as shown in Table 4-2.

The letter I was omitted because of its resemblance to the figure 1. The letter Q was omitted because of its resemblance to the figure 0.

Note

This numbering system is for use in simplifying the operation of the selector switches of the TV-3/U, and should not be confused with the RMA tube and socket numbering system.

(27) SPECIAL NOTES. Power line voltage varies in different localities, and may also vary somewhat aboard ship.

While a national survey indicates that the average voltage for the U. S. A. is about 117 volts, it does not

mean that every locality maintains a constant voltage at that level.

Occasionally there is the complaint that a used tube will test GOOD, but will not work in the radio receiver; but when a NEW tube is substituted, the receiver will operate correctly. The answer may be this: Tubes are built to specifications. Tube Tester TV-3/U is designed to test tubes in conformity with these specifications. The used tube that would not perform in a certain receiver may not be receiving its specified filament voltage. The new tube performed because of its initial reserve capacity. The used tube may have performed if it had received its specified filament voltage. Also the tube may be depending on characteristics other than its mutual conductance for satisfactory operation.

Tube failure frequently occurs in ac-dc sets where several tubes are connected with their heaters or filaments in series. Sometimes, even though the power line voltage is normal, a series tube with abnormally high filament resistance will rob its companion tube of its normal filament voltage. The robbed tube apparently fails; but when tested under specified conditions, the tube will test GOOD.

(28) TESTING SUB-MINIATURE TUBES.

(a) Sub-miniature tubes having wire leads in place of pins are tested in the TV-3/U by means of a special socket X112.

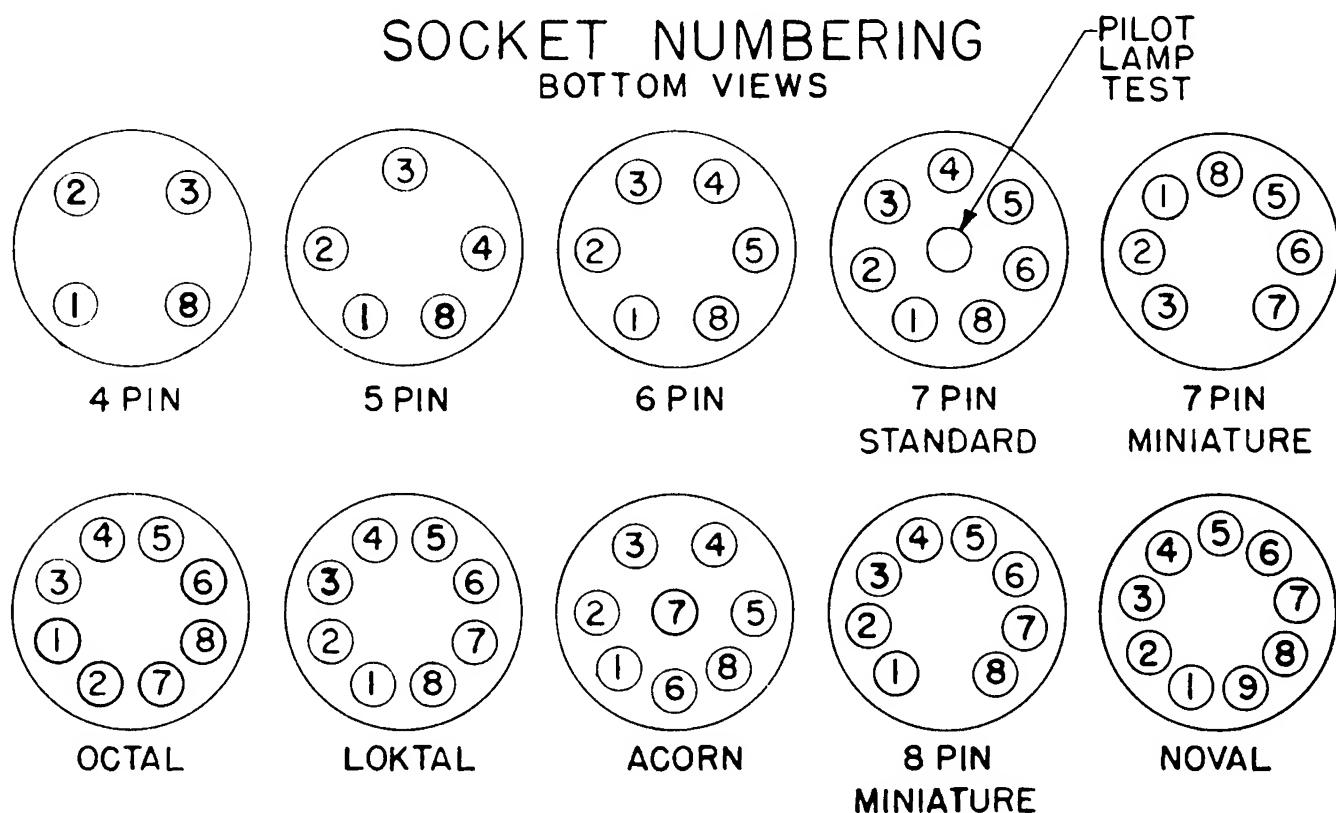


Figure 4-2. Socket Numbering

(b) There are several basings used for sub-miniature tubes and they are shown in Figure 4-3, and are all bottom views of the tubes, with leads numbered.

(c) A small 8 contact socket X112 is mounted on the panel for testing sub-miniature tubes. A top view is shown in Figure 4-4, with contacts numbered.

(d) The numbered leads of the tubes are inserted in the corresponding contacts of the socket. A good way to handle the leads is to grasp each lead about $\frac{1}{8}$ " from its end with the tips of a pair of long nose pliers, and insert the leads in their proper socket contact.

(e) Table 4-4 shows the proper tube test data for these sub-miniature types.

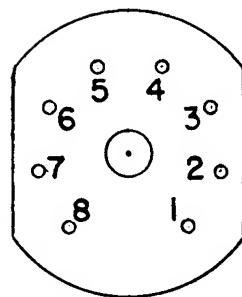


Figure 4-4. Top View of Socket X112

BASING DIAGRAMS FOR SUB MINIATURE TUBES

TUBES HAVING LESS THAN 8 LEADS HAVE AN ARROW ON THE SIDE OF TUBE INDICATING NO. 1 LEAD

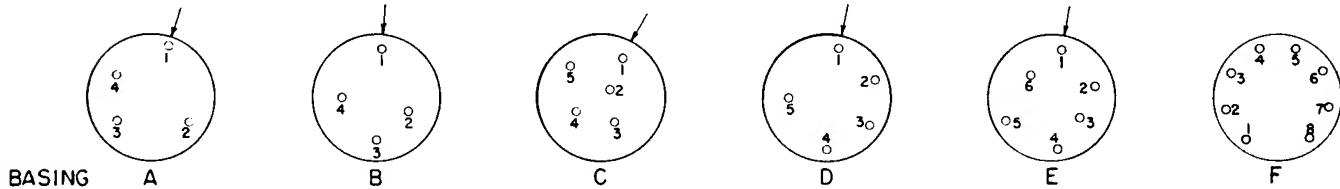


FIG. 4-3
BOTTOM VIEW OF TUBES

RMA NUMBERING

| NUMERICAL VALUE OF LETTERED DIAL TV-3/U | | | 4 PIN | 5 PIN | 6 PIN | 7 PIN | OCTAL | LOKTAL | 7 PIN MINIA- TURE | 9 PIN MINIA- TURE | SUB MINIA- TURE | ACORN |
|---|---|---|-------|-------|-------|-------|-------|--------|-------------------------|-------------------------|-----------------------|-------|
| 0 | A | P | | | | | | | | | | |
| 1 | B | R | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 |
| 2 | C | S | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 |
| 3 | D | T | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 |
| 4 | E | U | | 4 | 4 | 4 | 4 | 4 | | 4 | 4 | 4 |
| 5 | F | V | | | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6 | G | W | | | | 6 | 6 | 6 | 6 | 6 | 6 | |
| 7 | H | X | | | | | 8 | 7 | 7 | 7 | 7 | 7 |
| 8 | J | Y | 4 | 5 | 6 | 7 | 7 | 8 | 4 | 8 | 8 | 6 |
| 9 | K | Z | | | | | | | | 9 | | |

TABLE 4-2

TABLE 4-3. TUBE TEST DATA CHART

4-8 Section

NAVSHIPS 91254
TV-3/U

OPERATION

| Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut Cond. | Notations | Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut Cond. | Notations |
|-----------|-----------|-----------|------|----------|-------|-----------|--------------------|-----------|-----------|-----------|------|----------|-------------|------------------------------|---------------|
| 00A | 5.0 | JR-3200-0 | 33 | ... | P4 | 420 | 1F6 | 2.0 | JR-0230-0 | 26 | ... | P4 | 410 | Pent. Sect. Cap=G | |
| 01A | 5.0 | JR-3200-0 | 48 | ... | P4 | 460 | 1F6 | 2.0 | JR-0530-0 | 0 | 0 | P1 | 410 | {OK over 500 Diode No. 1} | |
| 0A2 | ... | JP-0502-0 | 0 | 37 | P5 | ... | 1F6 | 2.0 | JR-0430-0 | 0 | 0 | P1 | 410 | {OK over 500 Diode No. 2} | |
| 0A3 | ... | JP-0501-0 | 0 | 37 | P5 | ... | 1F7 | 2.0 | JR-0360-0 | 26 | ... | P4 | 410 | Pent. Sect. Cap=G | |
| 0A4G | ... | KS-0581-0 | 100 | 85 | P5 | ... | 1F7 | 2.0 | JR-0463-0 | 0 | 0 | P1 | 410 | {OK over 500 Diode No. 1} | |
| 0B2 | ... | JP-0502-0 | 0 | 20 | P5 | ... | 1F7 | 2.0 | JR-0563-0 | 0 | 0 | P1 | 410 | {OK over 500 Diode No. 2} | |
| 0B3 | ... | JP-0501-0 | 0 | 37 | P5 | ... | 1F7 | 2.0 | JR-5300-0 | 0 | 0 | P4 | 520 | Diode No. 1 | |
| 0C3 | ... | JP-0501-0 | 0 | 37 | P5 | ... | 1G4 | 1.5 | JR-5340-0 | 49 | ... | P4 | 950 | Diode No. 2 | |
| 0D3 | ... | JP-0501-0 | 0 | 37 | P5 | ... | 1G5 | 2.0 | JR-5340-0 | 37 | ... | P4 | 420 | Plate No. 1 | |
| BLST | JX-3502-0 | 0 | 40 | P2 | ... | 1G6 | 1.5 | JR-5600-0 | 16 | ... | P4 | 420 | Plate No. 2 | | |
| 0Y4 | ... | JR-0507-0 | 0 | 60 | P2 | ... | 1G6 | 1.5 | JR-4300-0 | 16 | ... | P4 | 570 | Triode Sect. Cap=G | |
| 0Z4 | ... | JR-0307-0 | 0 | 60 | P2 | ... | 1H4 | 2.0 | JR-5300-0 | 40 | ... | P4 | 175 | Triode Sect. Diode Sect. | |
| 1A3 | 1.5 | HT-0201-0 | 0 | 0 | P1 | 470 | Cap=G | 1H5 | 1.5 | JR-0300-0 | 16 | ... | P1 | 365 | Diode Sect. |
| 1A4 | 2.0 | JR-0230-0 | 29 | ... | P4 | 500 | Pent. Sect. Cap=G | 1H5 | 1.5 | JR-0500-0 | 0 | 0 | P1 | 600 | Diode Sect. |
| 1A5 | 1.5 | JR-5340-0 | 43 | ... | P4 | 470 | Pent. Sect. Cap=G | 1J5 | 2.0 | JR-6300-0 | 24 | Low Sig. | P4 | 630 | Triode No. 1 |
| 1A6 | 2.0 | JR-0250-4 | 35 | ... | P4 | 100 | Pent. Sect. Cap=G | 1J6 | 2.0 | JR-6500-0 | 0 | 0 | P1 | 630 | Triode No. 2 |
| 1A6 | 2.0 | JR-4350-2 | 35 | ... | P4 | 250 | Osc. Sect. | 1LA4 | 1.5 | JR-6400-0 | 0 | 0 | P1 | 650 | Heptode Sect. |
| 1A7G | 1.5 | JR-5340-0 | 30 | ... | P4 | 200 | Pent. Sect. Cap=G | 1LA6 | 2.0 | JR-5340-0 | 45 | ... | P4 | 500 | Osc. Sect. |
| 1A7G | 1.5 | JR-5643-0 | 46 | ... | P4 | 900 | Pent. Sect. Cap=G | 1LA6 | 1.5 | JR-5600-0 | 15 | ... | P4 | 630 | Pent. Sect. |
| 1AB5 | 1.1 | JR-6230-0 | 0 | ... | P4 | ... | Cap=P | 1LA6 | 2.0 | JR-4300-0 | 15 | ... | P4 | 630 | Osc. Sect. |
| 1B3 | 1.1 | JR-0000-0 | 0 | 60 | P5 | ... | Cap=G | 1LB4 | 1.5 | HT-6210-0 | 19 | ... | P4 | 580 | Heptode Sect. |
| 1B4 | 2.0 | JR-0230-0 | 35 | ... | P4 | 400 | Cap=G | 1LB4 | 1.5 | JR-6230-0 | 51 | ... | P4 | 250 | Osc. Sect. |
| 1B5 | 2.0 | JR-5200-0 | 24 | Low Sig. | P4 | 360 | Triode Sect. | 1LB6 | 1.5 | JR-6243-7 | 0 | ... | P4 | 950 | Pent. Sect. |
| 1B5 | 2.0 | JR-5400-0 | 0 | 0 | P1 | ... | Diode No. 1 | 1LB6 | 1.5 | JR-6357-4 | 20 | ... | P4 | 480 | Osc. Sect. |
| 1B5 | 2.0 | JR-5300-0 | 0 | 0 | P1 | ... | Diode No. 2 | 1LC5 | 1.5 | JR-6234-0 | 29 | ... | P4 | 630 | Pent. Sect. |
| 1B7 | 1.5 | JR-0340-5 | 24 | ... | P4 | 500 | Pent. Sect. Cap=G | 1LC6 | 1.5 | JR-6253-4 | 30 | ... | P4 | 350 | Osc. Sect. |
| 1B7 | 1.5 | JR-5640-3 | 46 | ... | P4 | 200 | Pent. Sect. Cap=G | 1LC6 | 1.5 | JR-4352-6 | 30 | ... | P4 | 380 | Pent. Sect. |
| 1C5 | 1.5 | JR-5340-0 | 44 | ... | P4 | 1000 | Ampl. Sect. Cap=G | 1LD5 | 1.5 | JR-6230-0 | 28 | ... | P4 | 480 | Diode Sect. |
| 1C6 | 2.0 | JR-0253-4 | 29 | ... | P4 | 410 | Pent. Sect. Cap=G | 1LD5 | 1.5 | JR-6430-0 | 0 | 0 | P1 | 820 | Heptode Sect. |
| 1C6 | 2.0 | JR-4352-0 | 50 | ... | P4 | 200 | Pent. Sect. Cap=G | 1LE3 | 1.5 | JR-6205-0 | 0 | 0 | P4 | 660 | Osc. Sect. |
| 1C7 | 2.0 | JR-0346-5 | 29 | ... | P4 | 410 | Pent. Sect. Cap=G | 1LG5 | 1.5 | JR-6234-0 | 25 | ... | P4 | 175 | Pent. Sect. |
| 1C7 | 2.0 | JR-5643-0 | 50 | ... | P4 | 200 | Pent. Sect. Cap=G | 1LH4 | 1.5 | JR-6200-0 | 16 | ... | P4 | 500 | Diode Sect. |
| 1D5 | 2.0 | JR-0340-0 | 29 | ... | P4 | 470 | Cap=G | 1LH4 | 1.5 | JR-6400-0 | 0 | 0 | P1 | 500 | Cap=G |
| 1D5 | 2.0 | JR-4376-5 | 35 | ... | P4 | 470 | Pent. Sect. Cap=G | 1LN5 | 1.5 | JR-6234-0 | 11 | ... | P4 | 480 | Pent. Sect. |
| 1D7 | 2.0 | JR-0346-5 | 35 | ... | P4 | 100 | Pent. Sect. Cap=G | 1N5 | 1.5 | JR-0340-0 | 11 | ... | P4 | 480 | Diode Sect. |
| 1D7 | 2.0 | JR-5643-0 | 35 | ... | P4 | 580 | Pent. Sect. Cap=G | 1N6 | 1.5 | JR-5340-0 | 43 | ... | P4 | 500 | Pent. Sect. |
| 1D8 | 1.5 | JR-5346-0 | 50 | ... | P4 | 360 | Triode Sect. Cap=G | 1N6 | 1.5 | JR-0600-0 | 43 | 0 | P1 | 500 | Diode Sect. |
| 1D8 | 1.5 | JR-5643-0 | 11 | ... | P4 | 470 | Cap=G | 1P5 | 1.5 | JR-0340-0 | 11 | ... | P4 | 480 | Cap=G |
| 1E4 | 1.5 | JR-5300-0 | 0 | 0 | P1 | 520 | Diode Sect. | 1Q5 | 1.5 | JR-5340-0 | 37 | ... | P4 | 1320 | Diode Sect. |
| 1E5 | 2.0 | JR-0340-0 | 35 | ... | P4 | 400 | Cap=G | 1R4 | 1.5 | JR-0407-0 | 0 | 0 | P1 | 380 | No. 1 Grid |
| 1E7 | 2.0 | JR-5673-4 | 10 | Low Sig. | P4 | 900 | No. 1 Plate | 1R5 | 1.5 | DX-8216-0 | 33 | ... | P4 | 315 | No. 2 Grid |
| 1E7 | 2.0 | JR-4376-5 | 10 | Low Sig. | P4 | 900 | No. 2 Plate | 1R5 | 1.5 | DX-6218-0 | 33 | ... | P4 | 950 | Pent. Sect. |
| 1F4 | 2.0 | JR-3240-0 | 23 | ... | P4 | 880 | ... | 1S4 | 1.5 | DX-1280-0 | 43 | ... | P4 | 330 | ... |
| 1F5 | 2.0 | JR-5340-0 | 23 | ... | P4 | 880 | ... | 1S5 | 1.5 | DX-6580-0 | 34 | ... | P4 | 330 | Pent. Sect. |

4-8

ORIGINAL

TABLE 4-3 (Continued)

| Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations |
|-----------|-----------|------------|------|----------|-------|------------|---|-----------|-----------|-----------|------|----------|-------|------------|-------------------|
| 1S5 | 1.5 | DX-01180-0 | 0 | 0 | P1 | ..... | Diode Sect. | 3A4 | 2.5 | DX-8210-0 | 33 | .... | P4 | 1260 | Triode No. 1 |
| 1SA6 | 1.5 | JR-4763-0 | 23 | ... | P4 | 600 | Pent. Sect. | 3A5 | 3.0 | DX-5600-0 | 32 | .... | P4 | 1260 | Triode No. 2 |
| 1SB6 | 1.5 | JR-7340-0 | 27 | ... | P4 | 410 | Diode Sect. | 3A5 | 3.0 | DX-1200-0 | 22 | .... | P4 | 1260 | Pent. Sect. Cap=G |
| 1SB6 | 1.5 | JR-7500-0 | 27 | 0 | P1 | ..... | Diode Sect. | 3A8 | 2.5 | JR-0340-0 | 12 | .... | P4 | 470 | Triode Sect. |
| 1T4 | 1.5 | DX-6210-0 | 34 | ... | P4 | 470 | ..... | 3A8 | 2.5 | JR-5640-0 | 12 | .... | P4 | 315 | Diode Sect. |
| 1T5 | 1.5 | JR-5340-0 | 45 | ... | P4 | 725 | ..... | 3A8 | 2.5 | JR-0740-0 | 0 | 0 | P1 | ..... | Diode Sect. |
| 1U4 | 1.5 | DX-6210-0 | 14 | ... | P4 | 565 | ..... | 3B4 | 2.5 | JV-1730-0 | 55 | .... | P4 | 1070 | Short on 3 |
| 1U5 | 1.5 | DX-6210-0 | 34 | ... | P4 | 330 | Pent. Sect. | 3B5 | 2.5 | JR-5340-0 | 60 | .... | P4 | 950 | ..... |
| 1U5 | 1.5 | DX-6810-0 | 34 | 0 | P1 | ..... | Diode Sect. | 3B7 | 2.5 | JR-6700-0 | 31 | Low Sig. | P4 | 1200 | Triode No. 1 |
| 1V | 6.3 | JR-0203-0 | 0 | 49 | P3 | ..... | Cap=P | 3B7 | 2.5 | JR-3200-0 | 31 | Low Sig. | P4 | 1200 | Triode No. 2. |
| 1Z2 | 1.5 | DS-0000-0 | 0 | 70 | P5 | ..... | Cap=P | 3B29 | 3.0 | JR-0000-0 | 0 | 87 | P5 | ..... | Cap=P |
| 2A3 | 2.5 | JR-3200-0 | 67 | ... | P4 | 1900 | ..... | 3C6 | 2.5 | BY-5600-0 | 10 | .... | P4 | 700 | Triode No. 1 |
| 2A4 | 2.5 | JR-5300-0 | 61 | 73 | P3 | ..... | ..... | 3C6 | 2.5 | JR-4300-0 | 10 | .... | P4 | 700 | Triode No. 2 |
| 2A5 | 2.5 | JR-4235-0 | 29 | ... | P4 | 1260 | ..... | 3D6 | 2.5 | JR-6230-0 | 37 | .... | P4 | 1320 | ..... |
| 2A6 | 2.5 | JR-0205-0 | 11 | Low Sig. | P4 | 700 | ..... | 3E6 | 3.0 | JR-6234-0 | 15 | Low Sig. | P4 | 1100 | Short on 3 |
| 2A6 | 2.5 | JR-0405-0 | 11 | 0 | P1 | ..... | ..... | 3E6 | 2.5 | JR-6237-4 | 55 | .... | P4 | 700 | ..... |
| 2A6 | 2.5 | JR-0305-0 | 11 | 0 | P1 | ..... | ..... | 3E6 | 2.5 | JR-6230-0 | 30 | .... | P4 | 1200 | ..... |
| 2A7 | 2.5 | JR-0236-5 | 22 | ... | P4 | 630 | Pent. Sect. Cap=G | 3O4 | 3.0 | HT-1280-0 | 24 | .... | P4 | 1340 | ..... |
| 2A7 | 2.5 | JR-5436-0 | 30 | ... | P4 | 250 | Osc. Sect. | 3Q5 | 2.5 | JR-5340-0 | 38 | .... | P4 | 1130 | ..... |
| 2B4 | 2.5 | JR-3204-0 | 72 | 91 | P5 | ..... | ..... | 3S4 | 2.5 | HT-1280-0 | 43 | .... | P4 | 820 | ..... |
| 2B6 | 2.5 | JR-4236-0 | 15 | ... | P4 | 950 | ..... | 3V4 | 3.0 | DX-6210-0 | 31 | .... | P4 | 1040 | ..... |
| 2B7 | 2.5 | JR-0236-0 | 30 | ... | P4 | 630 | Pent. Sect. Cap=G | 4A6 | 3.0 | JR-5600-0 | 20 | Low Sig. | P4 | 630 | Triode No. 1 |
| 2B7 | 2.5 | JR-0536-0 | 0 | 0 | P1 | ..... | Diode No. 1 | 4A6 | 3.0 | JR-4300-0 | 20 | Low Sig. | P4 | 630 | Triode No. 2 |
| 2B7 | 2.5 | JR-0436-0 | 0 | 0 | P1 | ..... | Diode No. 2 | 5AZ4 | 5.0 | JS-0400-6 | 0 | 18 | P3 | ..... | Plate No. 1 |
| 2C21 | 6.3 | JR-4506-0 | 17 | ... | P4 | 860 | Triode No. 1 | 5AZ4 | 5.0 | JS-0600-4 | 0 | 22 | P3 | ..... | Plate No. 2 |
| 2C21 | 6.3 | JR-0302-0 | 17 | ... | P4 | 860 | Triode No. 2, Cap=G | 5R4 | 5.0 | HR-0600-0 | 0 | 24 | P3 | ..... | Plate No. 1 |
| 2C22 | 6.3 | JR-0007-0 | 13 | ... | P4 | 1900 | {Upper Cap=G, Lower Cap=P, Lower Cap=G} | 5R4 | 5.0 | HR-0400-0 | 0 | 18 | P3 | ..... | Plate No. 2 |
| 2C26 | 6.3 | JR-0007-0 | 18 | ... | P4 | 950 | ..... | 5T4 | 5.0 | HR-0600-0 | 0 | 55 | P3 | ..... | Plate No. 1 |
| 2C45 | 7.5 | JR-3200-0 | 37 | ... | P4 | 1380 | ..... | 5U4 | 5.0 | HR-0400-0 | 0 | 49 | P3 | ..... | Plate No. 2 |
| 2C51 | 6.3 | KR-3402-8 | 17 | Low Sig. | P4 | 3300 | ..... | 5V4 | 5.0 | HR-0600-0 | 0 | 35 | P3 | ..... | Plate No. 1 |
| 2C51 | 6.3 | KR-7608-2 | 17 | Low Sig. | P4 | 3300 | ..... | 5V4 | 5.0 | HR-0400-0 | 0 | 30 | P3 | ..... | Plate No. 2 |
| 2C52 | 12.6 | JX-4506-1 | 9 | Low Sig. | P4 | 950 | ..... | 5W4 | 5.0 | HR-0600-0 | 0 | 20 | P3 | ..... | Plate No. 1 |
| 2C52 | 12.6 | JX-2103-5 | 9 | Low Sig. | P4 | 950 | ..... | 5W4 | 5.0 | HR-0400-0 | 0 | 15 | P3 | ..... | Plate No. 2 |
| 2C53 | 6.3 | JR-5007-0 | 0 | ... | P4 | 250 | Cap=P | 5X4 | 5.0 | JX-0500-0 | 0 | 43 | P3 | ..... | Plate No. 1 |
| 2D21 | 6.3 | JR-3602-5 | # | 80 | P3 | ..... | ..... | 5X4 | 5.0 | JX-0300-0 | 0 | 39 | P3 | ..... | Plate No. 2 |
| 2E5 | 2.5 | JR-5403-0 | ... | ... | P4 | ..... | Eye Open | 5Y3 | 5.0 | HR-0600-0 | 0 | 22 | P3 | ..... | Plate No. 1 |
| 2E5 | 2.5 | JR-5423-0 | ... | ... | P4 | ..... | Eye Closed | 5Y3 | 5.0 | HR-0400-0 | 0 | 18 | P3 | ..... | Plate No. 2 |
| 2E22 | 6.3 | JR-3024-0 | 0 | ... | P4 | 2500 | Cap=P | 5Y4 | 5.0 | JX-0500-0 | 0 | 16 | P3 | ..... | Plate No. 1 |
| 2E24 | 6.3 | JR-5030-0 | 35 | ... | P4 | 2000 | Short on 3, Cap=P | 5Y4 | 5.0 | JX-0300-0 | 0 | 12 | P3 | ..... | Plate No. 2 |
| 2E25 | 6.3 | JR-5040-7 | 0 | ... | P4 | 1900 | Cap=P | 5Z3 | 5.0 | JR-0300-0 | 0 | 49 | P3 | ..... | Plate No. 1 |
| 2E26 | 6.3 | JR-5032-7 | 37 | ... | P4 | 2200 | Cap=P | 5Z3 | 5.0 | JR-0200-0 | 0 | 43 | P3 | ..... | Plate No. 2 |
| 2E30 | 6.3 | JR-3560-2 | 20 | ... | P4 | 1900 | Cap=P | 5Z4 | 5.0 | HR-0600-0 | 0 | 73 | P3 | ..... | Plate No. 1 |
| 2V3 | 2.5 | JR-0000-0 | 0 | 50 | P5 | ..... | Cap=P | 5Z4 | 5.0 | HR-0400-0 | 0 | 73 | P3 | ..... | Plate No. 2 |
| 2W3 | 2.5 | HR-0400-0 | 0 | 30 | P3 | ..... | 6A3 | 6.3 | JR-3200-0 | 67 | .... | P4 | 1900 | ..... |  |
| 2X2A | 2.5 | JR-0000-0 | 0 | 73 | P5 | ..... | Cap=P | 6A4 | 6.3 | JR-3240-0 | 28 | .... | P4 | 1260 | ..... |
| 2Z2 | 2.5 | JR-0200-0 | 0 | 15 | P3 | ..... | Cap=P | 6A5 | 6.3 | JR-5300-0 | 67 | .... | P4 | 1900 | ..... |

TABLE 4-3 (Continued)

| Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut Cond. | Notations | Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut Cond. | Notations |
|-----------|-----------|-----------|------|----------|-------|-----------|----------------------|-----------|-----------|-----------|------|----------|-------|-----------|----------------------------------|
| 6A6 | 6.3 | JR-5604-0 | 12 | ... | P4 | 950 | Triode No. 1 | 6AL7 | 6.3 | JR-4357-0 | Vary | 100 | P4 | 5000 | {Bias Controls Right Pattern} |
| 6A6 | 6.3 | JR-3204-0 | 12 | ... | P4 | 950 | Triode No. 2 | | 6.3 | JR-3567-0 | 11 | ... | P4 | 2320 | Triode Sect. |
| 6A7 | 6.3 | JR-0236-5 | 22 | ... | P4 | 630 | Pent. Sect. Cap = G | 6AN5 | 6.3 | JR-3562-0 | 21 | ... | P4 | 725 | Diode No. 1 |
| 6A7 | 6.3 | JR-5436-2 | 30 | ... | P4 | 190 | Osc. Sect. | 6AQ5 | 6.3 | JR-3702-0 | 6 | ... | P1 | ... | Diode No. 2 |
| 6A8 | 6.3 | JR-0347-5 | 22 | ... | P4 | 630 | Pent. Sect., Cap = G | 6AQ6 | 6.3 | JR-0602-0 | 0 | 0 | P1 | ... | Triode Sect. |
| 6A8 | 6.3 | JR-5647-3 | 30 | ... | P4 | 190 | Osc. Sect. | 6AQ6 | 6.3 | JR-0502-0 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AB4 | 6.3 | JR-6307-0 | 14 | Low Sig. | P4 | 2500 | Eye Open | 6AQ6 | 6.3 | JX-4501-6 | 13 | ... | P4 | 630 | Diode No. 2 |
| 6AB5 | 6.3 | JR-5403-0 | ... | ... | P4 | ... | Eye Closed | 6AQ7 | 6.3 | JX-4201-6 | 0 | 0 | P1 | ... | Triode Sect. |
| 6AB5 | 6.3 | JR-5423-0 | ... | ... | P4 | 920 | ... | 6AQ7 | 6.3 | JX-4301-6 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AB6 | 6.3 | JR-5347-0 | 0 | ... | P4 | 2200 | ... | 6AR5 | 6.3 | JR-3562-0 | 34 | ... | P4 | 1000 | Diode No. 2 |
| 6AB7 | 6.3 | JR-4765-3 | 0 | ... | P4 | 530 | ... | 6AR6 | 6.3 | GX-8352-0 | 34 | ... | P4 | 3400 | ... |
| 6AC5 | 6.3 | JR-5307-0 | 0 | ... | P4 | 1500 | ... | 6AS5 | 6.3 | JR-2763-0 | 26 | ... | P4 | 3530 | ... |
| 6AC6 | 6.3 | JR-5347-0 | 0 | ... | P4 | 3800 | ... | 6AS6 | 6.3 | JR-3562-7 | 10 | Low Sig. | P4 | 1540 | ... |
| 6AC7 | 6.3 | JR-4765-3 | 10 | Low Sig. | P4 | ... | ... | 6AS7 | 6.3 | JX-4506-1 | 100 | ... | P4 | 1800 | Triode No. 1 |
| 6AD6 | 6.3 | JR-4357-0 | ... | ... | P4 | ... | ... | 6AS7 | 6.3 | JX-2103-5 | 100 | ... | P4 | 1800 | Triode No. 2 |
| 6AD6 | 6.3 | JR-3457-0 | ... | ... | P4 | ... | ... | 6AT6 | 6.3 | JR-3702-0 | 18 | ... | P4 | 750 | Triode Sect. |
| 6AD7 | 6.3 | JR-5347-6 | 29 | ... | P4 | 1260 | Eye 1 Open | 6AT6 | 6.3 | JR-3602-0 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AD7 | 6.3 | JR-2607-3 | 0 | ... | P4 | 380 | Eye 1 Closed | 6AT6 | 6.3 | JR-3502-0 | 0 | 0 | P1 | ... | Diode No. 2 |
| 6AE5 | 6.3 | JR-5307-0 | 68 | ... | P4 | 750 | Triode Sect. | 6AU6 | 6.3 | JR-3567-2 | 10 | Low Sig. | P4 | 2050 | ... |
| 6AE6 | 6.3 | JR-5407-3 | 0 | ... | P4 | 540 | Triode No. 2 | 6AV6 | 6.3 | JR-3602-5 | 0 | 0 | P1 | ... | Triode Sect. |
| 6AE6 | 6.3 | JR-5307-4 | 0 | ... | P4 | 470 | Triode No. 1 | 6AV6 | 6.3 | JR-3502-7 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AE7 | 6.3 | JR-6307-4 | 33 | ... | P4 | 950 | Triode No. 1 | 6AW7 | 6.3 | JX-1602-0 | 8 | Low Sig. | P4 | 750 | Diode No. 2 |
| 6AE7 | 6.3 | JR-4305-6 | 33 | ... | P4 | 950 | Triode No. 2 | 6AW7 | 6.3 | JX-1305-0 | 0 | 50 | P1 | ... | Triode Sect. |
| 6AF5 | 6.3 | JR-5307-0 | 51 | ... | P4 | ... | ... | 6AW7 | 6.3 | JX-1402-0 | 0 | 50 | P1 | ... | Diode No. 1 |
| 6AF6 | 6.3 | JR-4357-0 | ... | ... | P4 | ... | ... | 6B4 | 6.3 | JR-5300-0 | 67 | ... | P4 | 1900 | Diode No. 2 |
| 6AF6 | 6.3 | JR-3457-0 | ... | ... | P4 | ... | ... | 6B5 | 6.3 | JR-4235-0 | 0 | ... | P4 | 950 | ... |
| 6AF6 | 6.3 | JR-3457-0 | 10 | Low Sig. | P4 | ... | ... | 6B6 | 6.3 | JR-0307-0 | 10 | Low Sig. | P4 | 700 | Triode Sect., Cap = G |
| 6AG5 | 6.3 | JR-3562-0 | 10 | Low Sig. | P4 | 2500 | Eye 1 Closed | 6B6 | 6.3 | JR-0507-0 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AG7 | 6.3 | JR-4765-2 | 10 | Low Sig. | P4 | 3800 | ... | 6B6 | 6.3 | JR-0407-0 | 0 | 0 | P1 | ... | Diode No. 2 |
| 6AH5 | 6.3 | JR-6418-0 | 23 | ... | P4 | 3150 | ... | 6B7 | 6.3 | JR-0236-0 | 30 | ... | P4 | 630 | Pent. Sect. |
| 6AH6 | 6.3 | JR-3567-2 | 10 | Low Sig. | P4 | 3800 | ... | 6B7 | 6.3 | JR-0536-0 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AH7 | 6.3 | JX-5604-0 | 20 | Low Sig. | P4 | 1510 | Triode No. 1 | 6B8 | 6.3 | JR-0367-2 | 24 | ... | P4 | 720 | Diode No. 2 |
| 6AJ5 | 6.3 | JR-2301-0 | 20 | Low Sig. | P4 | 1510 | Triode No. 2 | 6B8 | 6.3 | JR-0567-2 | 0 | 0 | P1 | ... | Pent. Sect., Cap = G |
| 6AJ7 | 6.3 | JR-3562-0 | 27 | ... | P4 | 1730 | ... | 6B8 | 6.3 | JR-0467-2 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AK5 | 6.3 | JR-4765-3 | 10 | Low Sig. | P4 | 3800 | ... | 6BA6 | 6.3 | JR-3567-2 | 9 | ... | P4 | 2700 | Diode No. 2 |
| 6AK5 | 6.3 | JR-3562-0 | 10 | Low Sig. | P4 | 2780 | ... | 6BA7 | 6.3 | EV-7913-2 | 17 | ... | P4 | 470 | Ampl. Sect. |
| 6AK6 | 6.3 | JR-3567-2 | 23 | ... | P4 | 1320 | ... | 6BA7 | 6.3 | EV-2913-7 | 25 | ... | P4 | 470 | Osc. Sect. |
| 6AK7 | 6.3 | JR-4765-2 | 10 | Low Sig. | P4 | 3800 | ... | 6BD6 | 6.3 | JR-3567-2 | 13 | Low Sig. | P4 | 1260 | ... |
| 6AL5 | 6.3 | JR-0703-0 | 0 | 61 | P1 | ... | Diode No. 1 | 6BE6 | 6.3 | JR-7562-3 | 11 | ... | P4 | 900 | Ampl. Sect. |
| 6AL5 | 6.3 | JR-0205-0 | 0 | 61 | P1 | ... | Diode No. 2 | 6BE6 | 6.3 | JR-3562-7 | 0 | ... | P4 | 1000 | Osc. Sect. |
| 6AL6 | 6.3 | JR-5047-0 | 23 | ... | P4 | 3150 | Cap = P | 6BF6 | 6.3 | JR-3702-0 | 18 | ... | P4 | 1200 | Triode Sect. |
| 6AL7 | 6.3 | JR-6357-0 | Vary | 100 | P4 | ... | Bias Controls | 6BF6 | 6.3 | JR-3602-0 | 0 | 0 | P1 | ... | Diode No. 1 |
| 6AL7 | 6.3 | JR-5347-0 | Vary | 100 | P4 | ... | Left Pattern | 6BF6 | 6.3 | JR-3502-0 | 0 | 0 | P1 | ... | Diode No. 2 |
| 6AL7 | 6.3 | JR-5347-0 | Vary | 100 | P4 | ... | Both Patterns | 6BH6 | 6.3 | JR-5073-0 | 20 | ... | P4 | 3800 | Cap = P |
| 6AL7 | 6.3 | JR-5347-0 | Vary | 100 | P4 | ... | Both Patterns | 6BH6 | 6.3 | JR-3562-7 | 15 | ... | P4 | 1260 | Cap = P |

TABLE 4-3 (Continued)

| Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations |
|-----------|------------|-----------|-------|----------|-------|------------------------------|----------------------------|
| | Fil. Volts | Volts | Volts | Volts | Volts | Cond. | |
| 6BJ6 | 6.3 | JR-3562-7 | 0 | P4 | 2400 | 6L5 | 950 |
| 6C4 | 6.3 | JR-6307-0 | 24 | P4 | 1380 | 6L6 | 3150 |
| 6C5 | 6.3 | JR-5307-0 | 21 | P4 | 1260 | 6L7 | 410 |
| 6C6 | 6.3 | JR-0235-4 | 21 | P4 | 770 | 6L7 | 410 |
| 6C7 | 6.3 | JR-0206-0 | 29 | P4 | 780 | Cap=G Triode Sect., Cap=G | Pin Grid |
| 6C7 | 6.3 | JR-0506-0 | 0 | P1 | ..... | Diode No. 1 | Eye Open |
| 6C7 | 6.3 | JR-0406-0 | 0 | P1 | ..... | Diode No. 2 | Eye Closed |
| 6C8 | 6.3 | JR-5607-0 | 17 | P4 | 630 | Triode No. 1 | ..... |
| 6C8 | 6.3 | JR-0304-0 | 17 | P4 | 630 | Triode No. 2 | ..... |
| 6D4 | 6.3 | JR-3705-0 | 100 | P3 | ..... | {Tube Strikes at approx. 75} | Tube Strikes at approx. 75 |
| 6D5 | 6.3 | JR-5307-0 | 57 | P4 | 1260 | Pent. Sect., Cap=G | Cap=G |
| 6D6 | 6.3 | JR-0235-4 | 21 | P4 | 1000 | Cap=G | Cap=G |
| 6D7 | 6.3 | JR-0236-4 | 24 | P4 | 770 | Cap=G | Cap=G |
| 6D8 | 6.3 | JR-0347-5 | 22 | P4 | 630 | Pent. Sect., Cap=G | Triode Sect., Cap=G |
| 6D8 | 6.3 | JR-5647-3 | 30 | P4 | 190 | Eye Open | ..... |
| 6E5 | 6.3 | JR-5403-0 | .... | P4 | ..... | Eye Closed | ..... |
| 6E5 | 6.3 | JR-5423-0 | .... | P4 | ..... | Tube No. 1 | ..... |
| 6E6 | 6.3 | JR-5604-0 | 28 | P4 | 880 | Tube No. 2 | ..... |
| 6E6 | 6.3 | JR-3204-0 | 28 | P4 | 880 | Cap=G | ..... |
| 6E7 | 6.3 | JR-0236-4 | 24 | P4 | 950 | Cap=G | ..... |
| 6F4 | 6.3 | JR-2306-0 | 30 | P4 | 3800 | Low Sig. | Tube Strikes at approx. 75 |
| 6F5 | 6.3 | JR-0407-2 | 10 | P4 | 950 | Cap=G | Tube Strikes at approx. 75 |
| 6F6 | 6.3 | JR-5347-2 | 29 | P4 | 1260 | Pent. Sect., Cap=G | Triode Sect., Cap=G |
| 6F7 | 6.3 | JR-0236-5 | 28 | P4 | 700 | Triode Sect., Cap=G | ..... |
| 6F7 | 6.3 | JR-5436-2 | 28 | P4 | 315 | Triode Sect., Cap=G | ..... |
| 6F8 | 6.3 | JR-5607-0 | 23 | P4 | 1260 | Triode No. 1 | ..... |
| 6F8 | 6.3 | JR-0304-0 | 23 | P4 | 1260 | Triode No. 2, Cap=G | ..... |
| 6G5 | 6.3 | JR-5403-0 | .... | P4 | ..... | Eye Open | ..... |
| 6G5 | 6.3 | JR-5423-0 | .... | P4 | ..... | Eye Closed | ..... |
| 6G6 | 6.3 | JR-5347-0 | 12 | P4 | 1450 | Diode No. 1 | ..... |
| 6H4 | 6.3 | JR-0407-0 | 0 | P1 | ..... | Diode No. 2 | ..... |
| 6H5 | 6.3 | JR-5403-0 | .... | P4 | ..... | Eye Open | ..... |
| 6H5 | 6.3 | JR-5423-0 | .... | P4 | ..... | Eye closed | ..... |
| 6H6 | 6.3 | JR-0507-0 | 0 | P1 | ..... | Diode Sect. | ..... |
| 6H6 | 6.3 | JR-0304-0 | 0 | P1 | ..... | Triode Sect. | ..... |
| 6J4 | 6.3 | JR-3702-0 | 15 | Low Sig. | 5700 | Triode No. 1 | ..... |
| 6J5 | 6.3 | JR-5307-0 | 22 | Low Sig. | 1640 | Triode No. 2 | ..... |
| 6J6 | 6.3 | JR-6307-0 | 15 | Low Sig. | 2800 | Cap=G | ..... |
| 6J6 | 6.3 | JR-0347-5 | 22 | P4 | 770 | Hepiode Sect. Cap=G | ..... |
| 6J7 | 6.3 | JR-5347-6 | 18 | P4 | 630 | Triode Sect. | ..... |
| 6J8 | 6.3 | JR-5647-3 | 30 | P4 | 315 | Triode Sect. | ..... |
| 6J8 | 6.3 | JR-0307-0 | 17 | Low Sig. | 840 | Cap=G | ..... |
| 6K5 | 6.3 | JR-5347-0 | 34 | P4 | 1000 | Cap=G | ..... |
| 6K6 | 6.3 | JR-0347-5 | 19 | P4 | 910 | Cap=G | ..... |
| 6K7 | 6.3 | JR-0347-5 | 11 | P4 | 630 | Hexode Sect. Cap=G | |
| 6K8 | 6.3 | JR-5647-3 | 0 | P4 | 1500 | Triode Sect. | |
| 6K8 | 6.3 | JR-0503-6 | 0 | P4 | 0 | Diode No. 1 | 0 |

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TABLE 4-3 (Continued)

| Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations |
|-----------|------------|-----------|------|----------|-------|------------|-------------------------------------|-----------|------------|------------|------|----------|-------|------------|---------------------------|
| 6SQ7 | 6.3 | JX-0403-6 | 0 | 0 | P1 | 1200 | Diode No. 2 Triode Sect. | 6Z4 | 6.3 | JR-0204-0 | 0 | 35 | P3 | ..... | Plate No. 2 |
| 6SR7 | 6.3 | JX-1603-2 | 18 | 0 | P4 | 1200 | Diode No. 1 Triode Sect. | 6Z5 | 6.3 | JS-0504-0 | 0 | 49 | P3 | ..... | Plate No. 1 |
| 6SR7 | 6.3 | JX-0503-6 | 0 | 0 | P1 | 1160 | Diode No. 2 Triode Sect. | 6Z7 | 6.3 | JS-0304-0 | 0 | 49 | P3 | ..... | Plate No. 2 |
| 6SR7 | 6.3 | JX-0403-6 | 0 | 0 | P1 | 1200 | Diode No. 1 Triode Sect. | 6Z7 | 6.3 | JR-5607-0 | 0 | .... | P4 | 760 | Triode No. 1 |
| 6SS7 | 6.3 | JR-4765-3 | 19 | 0 | P4 | 1160 | Diode No. 2 Triode Sect. | 6ZY5 | 6.3 | JR-4307-0 | 0 | .... | P4 | 760 | Triode No. 2 |
| 6ST7 | 6.3 | JX-1603-2 | 15 | 0 | P4 | 1200 | Diode No. 1 Triode Sect. | 6ZY5 | 6.3 | JR-0507-0 | 0 | 30 | P3 | ..... | Plate No. 1 |
| 6ST7 | 6.3 | JX-0503-6 | 0 | 0 | P1 | 1200 | Diode No. 2 Triode Sect. | 7A4 | 6.3 | JR-0307-0 | 0 | 30 | P3 | ..... | Plate No. 2 |
| 6ST7 | 6.3 | JX-0403-6 | 0 | 0 | P1 | 1000 | Diode No. 2 Triode Sect. | 7A5 | 6.3 | JR-6207-0 | 22 | Low Sig. | P4 | 1640 | ..... |
| 6SU7 | 6.3 | JX-4506-1 | 7 | Low Sig. | P4 | 1000 | Triode No. 1 Triode Sect. | 7A6 | 6.3 | JR-6237-0 | 28 | .... | P4 | 3800 | ..... |
| 6SU7 | 6.3 | JX-2103-5 | 7 | Low Sig. | P4 | 1000 | Triode No. 2 Pent. Sect. | 7A6 | 6.3 | JR-0607-5 | 0 | 49 | P1 | ..... | Diode No. 1 |
| 6SV7 | 6.3 | JX-1643-0 | 12 | 0 | P4 | 1320 | Diode Sect. Diode Sect. | 7A6 | 6.3 | JR-0302-5 | 0 | 49 | P1 | ..... | Diode No. 2 |
| 6SV7 | 6.3 | JX-1543-0 | 0 | 0 | P1 | 760 | Triode Sect. Triode Sect. | 7A7 | 6.3 | JR-6237-4 | 27 | .... | P4 | 1100 | Ampl. Sect. Osc. Sect. |
| 6SZ7 | 6.3 | JX-1603-2 | 10 | 0 | P4 | 760 | Diode No. 1 Diode No. 2 | 7A8 | 6.3 | JR-6257-4 | 24 | .... | P4 | 630 | ..... |
| 6SZ7 | 6.3 | JX-0503-2 | 0 | 0 | P1 | 760 | Diode No. 1 Diode No. 2 | 7A8 | 6.3 | JR-4357-6 | 26 | .... | P4 | 315 | ..... |
| 6SZ7 | 6.3 | JX-0403-2 | 0 | 0 | P1 | 760 | Eye Open Eye Closed | 7AB7 | 6.3 | HS-5314-0 | 10 | .... | P4 | 1140 | ..... |
| 6T5 | 6.3 | JR-5403-0 | .... | .... | P4 | 760 | Triode Sect. Triode Sect., Cap=G | 7AD7 | 6.3 | JR-6237-4 | 0 | Low Sig. | P4 | 3900 | ..... |
| 6T5 | 6.3 | JR-5423-0 | .... | .... | P4 | 630 | Triode Sect., Cap=G | 7AF7 | 6.3 | JR-5607-0 | 21 | .... | P4 | 1640 | Triode No. 1 |
| 6T7 | 6.3 | JR-0307-0 | 17 | 0 | P1 | 630 | Diode No. 1 Diode No. 2 | 7AG7 | 6.3 | JR-4302-0 | 21 | .... | P4 | 1640 | Triode No. 2 |
| 6T7 | 6.3 | JR-0507-0 | 0 | 0 | P1 | 677 | Diode No. 1 Diode No. 2 | 7AH7 | 6.3 | JR-6237-4 | 0 | .... | P4 | 1900 | ..... |
| 6T8 | 6.3 | JR-0407-0 | 0 | 0 | P1 | 760 | Diode No. 2 Triode Sect. | 7AJ7 | 6.3 | JR-6237-4 | 0 | Low Sig. | P4 | 2100 | ..... |
| 6T8 | 6.3 | EV-8907-6 | 11 | 0 | P4 | 760 | Diode No. 1 Diode No. 2 | 7AK7 | 6.3 | JR-6237-4 | 0 | .... | P4 | 1430 | ..... |
| 6T8 | 6.3 | EV-0607-1 | 0 | 50 | P1 | 760 | Diode No. 1 Diode No. 2 | 7B4 | 6.3 | JR-6207-0 | 10 | Low Sig. | P4 | 2500 | ..... |
| 6T8 | 6.3 | EV-0203-7 | 0 | 50 | P1 | 760 | Diode No. 3 Diode No. 3 | 7B5 | 6.3 | JR-6237-0 | 34 | .... | P4 | 950 | ..... |
| 6U5 | 6.3 | JR-5403-0 | .... | .... | P4 | 760 | Eye open Eye open | 7B6 | 6.3 | JR-3207-0 | 11 | Low Sig. | P4 | 1000 | Triode Sect. |
| 6U5 | 6.3 | JR-5423-0 | .... | .... | P4 | 760 | Eye Closed Eye Closed | 7B6 | 6.3 | JR-60607-2 | 0 | 0 | P1 | 700 | Diode No. 1 |
| 6U6 | 6.3 | JR-5347-0 | 33 | 0 | P4 | 3900 | Cap=G | 7B6 | 6.3 | JR-0507-2 | 0 | 0 | P1 | --- | Diode No. 2 |
| 6U7 | 6.3 | JR-0347-5 | 21 | 0 | P4 | 1000 | Cap=G | 7B7 | 6.3 | JR-6237-4 | 27 | .... | P4 | 1070 | ..... |
| 6V5 | 6.3 | JX-5340-0 | 31 | 0 | P4 | 2600 | Cap=G | 7B8 | 6.3 | JR-6257-4 | 18 | .... | P4 | 950 | Pent. Sect. |
| 6V6 | 6.3 | JR-5347-2 | 21 | 0 | P4 | 2320 | Cap=G | 7B8 | 6.3 | JR-4357-6 | 18 | .... | P4 | 410 | Osc. Sect. |
| 6V7 | 6.3 | JR-0307-0 | 39 | 0 | P1 | 610 | Diode No. 1 Diode No. 2 | 7C4 | 6.3 | JR-0407-0 | 0 | 30 | P1 | ..... | ..... |
| 6V7 | 6.3 | JR-0507-0 | 39 | 0 | P1 | 1900 | Diode No. 1 Diode No. 2 | 7C5 | 6.3 | JR-6237-0 | 30 | .... | P4 | 1900 | Triode Sect. |
| 6W4 | 6.3 | JX-0503-0 | 0 | 72 | P3 | 770 | Cap=G | 7C6 | 6.3 | JR-0607-2 | 0 | 0 | P1 | ..... | Diode No. 2 |
| 6W5 | 6.3 | JR-0507-0 | 0 | 33 | P3 | 1900 | Plate No. 1 Plate No. 2 | 7C6 | 6.3 | JR-0507-2 | 0 | 0 | P1 | 820 | ..... |
| 6W5 | 6.3 | JR-0300-0 | 0 | 33 | P3 | 1900 | Plate No. 1 Plate No. 2 | 7C7 | 6.3 | JR-6237-4 | 22 | .... | P4 | 1900 | Triode Sect. |
| 6W6 | 6.3 | JR-5347-0 | 56 | 0 | P4 | 770 | Plate No. 1 Plate No. 2 | 7E5 | 6.3 | JS-1304-0 | 15 | .... | P4 | 820 | ..... |
| 6W7 | 6.3 | JR-0347-5 | 22 | 0 | P4 | 1900 | Plate No. 1 Plate No. 2 | 7E6 | 6.3 | JR-3207-0 | 18 | .... | P4 | 1200 | ..... |
| 6X4 | 6.3 | JR-0607-0 | 0 | 20 | P3 | 1900 | Plate No. 1 Plate No. 2 | 7E6 | 6.3 | JR-0607-2 | 0 | 0 | P1 | 820 | Diode No. 1 |
| 6X4 | 6.3 | JR-0307-0 | 0 | 20 | P3 | 1900 | Plate No. 1 Plate No. 2 | 7E6 | 6.3 | JR-0507-2 | 0 | 0 | P1 | 820 | Diode No. 2 |
| 6X5 | 6.3 | JR-0507-2 | 0 | 33 | P3 | 1900 | Plate No. 1 Plate No. 2 | 7E7 | 6.3 | JR-6257-0 | 22 | .... | P4 | 820 | Pent. Sect. |
| 6X5 | 6.3 | JR-0307-2 | 0 | 33 | P3 | 1900 | Plate No. 1 Plate No. 2 | 7E7 | 6.3 | JR-0407-2 | 22 | 0 | P1 | 820 | Diode No. 1 |
| 6Y5 | 6.3 | JR-0504-0 | 0 | 30 | P3 | 3800 | Plate No. 1 Plate No. 2 | 7F7 | 6.3 | JR-05607-3 | 0 | .... | P4 | 820 | Triode No. 1 |
| 6Y5 | 6.3 | JR-0304-0 | 0 | 30 | P3 | 3800 | Plate No. 1 Plate No. 2 | 7F7 | 6.3 | JR-4302-6 | 0 | .... | P4 | 820 | Triode No. 2 |
| 6Y6 | 6.3 | JR-5347-0 | 44 | 0 | P4 | 630 | Triode No. 1 Triode No. 2 | 7F8 | 6.3 | HS-8605-0 | 10 | Low Sig. | P4 | 3150 | Triode No. 1 |
| 6Y7 | 6.3 | JR-5607-3 | 15 | 0 | P4 | 630 | Triode No. 1 Triode No. 2 | 7F8 | 6.3 | HS-1304-0 | 10 | Low Sig. | P4 | 3150 | Triode No. 2 |
| 6Z4 | 6.3 | JR-4307-6 | 15 | 0 | P3 | 35 | Plate No. 1 | 7G7 | 6.3 | JR-6237-4 | 18 | .... | P4 | 1260 | ..... |

TABLE 4-3 (Continued)

| Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations |
|-----------|------------|-----------|------|----------|-------|------------|----------------------|-----------|------------|-----------|------|----------|-------|------------|------------------------|
| 7G8 | 6.3 | JR-5736-2 | 10 | --- | P4 | 1320 | Tetrode No. 1 | 12AU7 | 12.6 | EV-7608-0 | 24 | --- | P4 | 1400 | Triode No. 1 |
| 7G8 | 6.3 | JR-4236-7 | 10 | --- | P4 | 1320 | Tetrode No. 2 | 12AU7 | 12.6 | EV-2103-0 | 24 | --- | P4 | 1400 | Triode No. 2 |
| 7H7 | 6.3 | JR-6237-4 | 10 | Low Sig. | P4 | 2400 | Heptode Sect. | 12AV6 | 12.6 | JR-3702-5 | 12 | --- | P4 | 790 | Triode Sect. |
| 7J7 | 6.3 | JR-6257-4 | 18 | --- | P4 | 500 | Triode Sect. | 12AV6 | 12.6 | JR-3602-5 | 0 | 0 | P1 | --- | Diode No. 1 |
| 7J7 | 6.3 | JR-4357-6 | 18 | --- | P4 | 630 | Triode Sect. | 12AV6 | 12.6 | JR-3502-6 | 0 | 0 | P1 | --- | Diode No. 2 |
| 7K7 | 6.3 | JR-4302-0 | 10 | Low Sig. | P4 | 1000 | Triode Sect. | 12AW6 | 12.6 | JR-3562-7 | 10 | Low Sig. | P4 | 2500 | Triode No. 2 |
| 7K7 | 6.3 | JR-0507-0 | 10 | 0 | P1 | --- | Diode No. 1 | 12AX7 | 12.6 | EV-7608-0 | 8 | Low Sig. | P4 | 950 | Triode No. 1 |
| 7K7 | 6.3 | JR-0607-0 | 10 | 0 | P1 | --- | Diode No. 2 | 12AX7 | 12.6 | EV-2103-0 | 8 | Low Sig. | P4 | 950 | Triode No. 2 |
| 7L7 | 6.3 | JR-6237-4 | 12 | --- | P4 | 1260 | Triode No. 1 | 12AY7 | 12.6 | EV-7608-0 | 15 | Low Sig. | P4 | 1100 | Triode No. 1 |
| 7N7 | 6.3 | JR-5607-3 | 29 | --- | P4 | 1260 | Triode No. 2 | 12AY7 | 12.6 | EV-2103-0 | 15 | Low Sig. | P4 | 1100 | Triode No. 2 |
| 7N7 | 6.3 | JR-4302-6 | 29 | --- | P4 | 1260 | Triode No. 2 | 12B7 | 12.6 | JR-6237-4 | 22 | --- | P4 | 1200 | Ampl. Sect., Cap = G |
| 7Q7 | 6.3 | JR-6237-4 | 21 | --- | P4 | 500 | Ampl. Sect. | 12B8 | 12.6 | JR-0342-0 | 22 | --- | P4 | 1140 | Pent. Sect., Cap = G |
| 7Q7 | 6.3 | JR-4237-6 | 21 | --- | P4 | 500 | Osc. Sect. | 12B8 | 12.6 | JR-7506-0 | 0 | --- | P4 | 1260 | Triode Sect. |
| 7R7 | 6.3 | JR-6257-0 | 10 | --- | P4 | 1900 | Pent. Sect. | 12BA6 | 12.6 | JR-3567-2 | 9 | --- | P4 | 2700 | Ampl. Sect. |
| 7R7 | 6.3 | JR-0407-2 | 10 | 0 | P1 | --- | Diode No. 1 | 12BA7 | 12.6 | EV-7913-2 | 17 | --- | P4 | 470 | Ampl. Sect. |
| 7R7 | 6.3 | JR-0307-2 | 10 | 0 | P1 | --- | Diode No. 2 | 12BD6 | 12.6 | JR-3567-2 | 25 | --- | P4 | 470 | Osc. Sect. |
| 7S7 | 6.3 | JR-6257-4 | 18 | --- | P4 | 950 | Heptode Sect. | 12BE6 | 12.6 | JR-7562-3 | 11 | --- | P4 | 1260 | Ampl. Sect. |
| 7S7 | 6.3 | JR-4357-6 | 0 | --- | P4 | 950 | Triode Sect. | 12BE6 | 12.6 | JR-3562-7 | 0 | --- | P4 | 900 | Osc. Sect. |
| 7T7 | 6.3 | JR-6237-4 | 9 | --- | P4 | 1900 | --- | 12BF6 | 12.6 | JR-3702-0 | 14 | --- | P4 | 1000 | Ampl. Sect. |
| 7V7 | 6.3 | JR-6237-4 | 6 | --- | P4 | 2500 | --- | 12BF6 | 12.6 | JR-3602-0 | 0 | 0 | P1 | 1200 | Triode Sect. |
| 7W7 | 6.3 | JR-6237-5 | 10 | Low Sig. | P4 | 2200 | Triode Sect. | 12BF6 | 12.6 | JR-3502-0 | 0 | 0 | P1 | --- | Diode No. 1 |
| 7X7 | 6.3 | JR-3204-0 | 0 | --- | P1 | 570 | Diode No. 1 | 12C8 | 12.6 | JR-0367-2 | 24 | 0 | P4 | 725 | Diode No. 2 |
| 7X7 | 6.3 | JR-0504-0 | 0 | 61 | P1 | --- | Diode No. 2 | 12C8 | 12.6 | JR-0507-3 | 24 | 0 | P1 | --- | Diode No. 1 |
| 7Y4 | 6.3 | JR-0607-0 | 0 | 33 | P3 | --- | Plate No. 1 | 12F5 | 12.6 | JR-0407-3 | 24 | 0 | P1 | --- | Diode No. 2 |
| 7Y4 | 6.3 | JR-0307-0 | 0 | 33 | P3 | --- | Plate No. 2 | 12F5 | 12.6 | JR-0407-0 | 10 | Low Sig. | P4 | 950 | Cap = G |
| 7Z4 | 6.3 | JR-0607-0 | 0 | 24 | P3 | --- | Plate No. 1 | 12H6 | 12.6 | JR-0507-2 | 0 | 61 | P1 | --- | Diode No. 1 |
| 7Z4 | 6.3 | JR-0307-0 | 0 | 24 | P3 | --- | Plate No. 2 | 12H6 | 12.6 | JR-0304-2 | 0 | 61 | P1 | --- | Diode No. 2 |
| 10 | 7.5 | JR-3200-0 | 39 | --- | P4 | 790 | --- | 12J5 | 12.6 | JR-5307-2 | 22 | Low Sig. | P4 | 1640 | Cap = G |
| 10Y | 7.5 | JR-3200-0 | 12 | --- | P4 | 950 | --- | 12J7 | 12.6 | JR-0347-5 | 22 | --- | P4 | 770 | Cap = G |
| 12A | 5.0 | JR-3200-0 | 44 | --- | P4 | 1040 | --- | 12K7 | 12.6 | JR-0347-5 | 19 | --- | P4 | 920 | Cap = G |
| 12A5 | 12.6 | JR-4235-0 | 51 | --- | P4 | 1130 | --- | 12K8 | 12.6 | JR-5347-6 | 11 | --- | P4 | 630 | Heptode Sect., Cap = G |
| 12A6 | 12.6 | JR-5347-2 | 12 | --- | P4 | 1900 | --- | 12K8 | 12.6 | JR-5647-3 | 0 | --- | P4 | 1500 | Triode Sect. |
| 12A7 | 12.6 | JR-0236-5 | 48 | --- | P4 | 610 | Rect. Sect. | 12L8 | 12.6 | JW-2751-3 | 10 | --- | P4 | 1340 | Pentode No. 1 |
| 12A7 | 12.6 | JR-0504-2 | 0 | 40 | P3 | --- | Pent. Sect., Cap = G | 12L8 | 12.6 | JW-3451-2 | 10 | --- | P4 | 1340 | Pentode No. 2 |
| 12A8 | 12.6 | JR-0347-5 | 22 | --- | P4 | 630 | --- | 12Q7 | 12.6 | JR-0307-0 | 17 | --- | P4 | 500 | Triode Sect., Cap = G |
| 12A8 | 12.6 | JR-5647-3 | 37 | --- | P4 | 190 | Osc. Sect. | 12Q7 | 12.6 | JR-0507-3 | 17 | 0 | P1 | --- | Diode No. 2 |
| 12AH7 | 12.6 | JX-5604-3 | 20 | --- | P4 | 1260 | Triode No. 1 | 12S8 | 12.6 | JR-0407-3 | 17 | 0 | P1 | --- | Diode No. 3 |
| 12AH7 | 12.6 | JX-2301-6 | 20 | --- | P4 | 1260 | Triode No. 2 | 12S8 | 12.6 | JX-0601-0 | 10 | --- | P4 | 570 | Triode Sect., Cap = G |
| 12AL5 | 12.6 | JR-0703-0 | 0 | 61 | P1 | --- | Plate No. 1 | 12S8 | 12.6 | JX-0305-0 | 0 | 0 | P1 | --- | Diode No. 1 |
| 12AL5 | 12.6 | JR-0205-0 | 0 | 61 | P1 | --- | Plate No. 2 | 12S8 | 12.6 | JX-0401-0 | 0 | 0 | P1 | --- | Diode No. 2 |
| 12AT6 | 12.6 | JR-3702-0 | 18 | --- | P4 | 750 | Triode Sect. | 12SA7 | 12.6 | JX-0201-0 | 0 | 0 | P1 | --- | Diode No. 3 |
| 12AT6 | 12.6 | JR-3602-0 | 18 | 0 | P1 | --- | Diode No. 1 | 12SA7 | 12.6 | JR-7346-5 | 21 | --- | P4 | 470 | Ampl. Sect. |
| 12AT6 | 12.6 | JR-3502-0 | 18 | 0 | P1 | --- | Diode No. 2 | 12SC7 | 12.6 | JX-4506-1 | 21 | --- | P4 | 470 | Osc. Sect. |
| 12AT7 | 12.6 | EV-7608-0 | 14 | Low Sig. | P4 | 2500 | Triode No. 1 | 12SC7 | 12.6 | JX-3106-5 | 10 | Low Sig. | P4 | 840 | Triode No. 1 |
| 12AT7 | 12.6 | EV-2103-0 | 14 | Low Sig. | P4 | 2500 | Triode No. 2 | 12SF5 | 12.6 | JX-3501-0 | 10 | Low Sig. | P4 | 840 | Triode No. 2 |
| 12AU6 | 12.6 | JR-3567-2 | 10 | Low Sig. | P4 | 2050 | --- | 12SF5 | 12.6 | JX-3501-0 | 10 | Low Sig. | P4 | 950 | --- |

TABLE 4-3 (Continued)

| Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | | |
|-----------|------------|-----------|------|----------|-------|------------|------------------------------|-----------|------------|-----------|------|-----------|-------|------------|-------------------------------|------|------------------------------|
| 12SF7 | 12.6 | JX-1643-2 | 0 | ... | P4 | 1260 | Pent. Sect. Diode Sect.. | 14H7 | 12.6 | JR-6237-4 | 10 | Low Sig. | P4 | 2400 | Heptode Sect. Triode Sect. | | |
| 12SF7 | 12.6 | JX-0503-6 | 0 | 0 | P1 | 2100 | ..... | 14J7 | 12.6 | JR-6257-4 | 18 | ... | P4 | 500 | ..... |  |  |
| 12SG7 | 12.6 | JR-4765-2 | 0 | ... | P4 | 2150 | ..... | 14N7 | 12.6 | JR-4357-6 | 18 | ... | P4 | 630 | Triode No. 1 Triode No. 2 | | |
| 12SH7 | 12.6 | JR-4765-2 | 0 | ... | P4 | 20 | Low Sig. | P4 | 1050 | 14N7 | 12.6 | JR-5602-6 | 20 | Low Sig. | P4 | 1640 | Triode No. 1 Triode No. 2 |
| 12SJ7 | 12.6 | JR-4765-3 | 10 | Low Sig. | P4 | 1260 | ..... | 14O4 | 12.6 | JR-6237-4 | 21 | ... | P4 | 1640 | Pent. Sect. Osc. Sect. | | |
| 12SK7 | 12.6 | JR-4765-3 | 7 | Low Sig. | P4 | 1000 | ..... | 14Q4 | 12.6 | JR-4237-6 | 21 | ... | P4 | 500 | ..... |  |  |
| 12SL7 | 12.6 | JX-4506-1 | 7 | Low Sig. | P4 | 1000 | Triode No. 1 Triode No. 2 | 14R7 | 12.6 | JR-6257-0 | 10 | ... | P4 | 1900 | Pent. Sect. | | |
| 12SL7 | 12.6 | JX-2103-5 | 7 | Low Sig. | P4 | 1640 | Triode No. 1 Triode No. 2 | 14R7 | 12.6 | JR-0407-2 | 10 | 0 | P1 | ..... | Diode No. 1 Diode No. 2 | | |
| 12SN7 | 12.6 | JX-4506-1 | 22 | Low Sig. | P4 | 1640 | Triode No. 1 Triode No. 2 | 14R7 | 12.6 | JR-0307-2 | 10 | 0 | P1 | ..... | Heptode Sect. Triode Sect. | | |
| 12SN7 | 12.6 | JX-2103-5 | 22 | Low Sig. | P4 | 700 | Triode Sect. | 14S7 | 12.6 | JR-6257-4 | 18 | ... | P4 | 950 | ..... |  |  |
| 12SQ7 | 12.6 | JX-1603-2 | 11 | Low Sig. | P4 | 0 | ..... | 14S7 | 12.6 | JR-4357-6 | 0 | ... | P4 | 950 | ..... |  |  |
| 12SQ7 | 12.6 | JX-0503-6 | 0 | 0 | P1 | ..... | Diode No. 1 | 14V7 | 12.6 | JR-6237-4 | 6 | ... | P4 | 2500 | ..... |  |  |
| 12SR7 | 12.6 | JX-1603-2 | 0 | 0 | P1 | 1200 | Triode Sect. | 14W7 | 12.6 | JR-6237-5 | 10 | Low Sig. | P4 | 2200 | Triode Sect. | | |
| 12SR7 | 12.6 | JX-0503-6 | 0 | 0 | P1 | ..... | Diode No. 1 | 14X7 | 12.6 | JR-3204-0 | 0 | ... | P4 | 570 | Diode No. 1 Diode No. 2 | | |
| 12SR7 | 12.6 | JX-0403-6 | 0 | 0 | P1 | 1200 | Triode Sect. | 14X7 | 12.6 | JR-0504-0 | 0 | 0 | P1 | ..... | Plate No. 1 Plate No. 2 | | |
| 12SW7 | 12.6 | JX-1603-2 | 14 | ... | P4 | 1200 | Triode Sect. | 14X7 | 12.6 | JR-0607-0 | 0 | 0 | P1 | ..... | Plate No. 1 Plate No. 2 | | |
| 12SW7 | 12.6 | JX-0503-6 | 0 | 0 | P1 | ..... | Diode No. 1 | 14Y4 | 12.6 | JR-0607-0 | 0 | 33 | P3 | ..... | ..... |  |  |
| 12SW7 | 12.6 | JX-0403-6 | 0 | 0 | P1 | ..... | Diode No. 2 | 14Y4 | 12.6 | JR-0307-0 | 0 | 33 | P3 | ..... | ..... |  |  |
| 12SX7 | 12.6 | JX-4506-1 | 21 | Low Sig. | P4 | 1640 | Triode No. 1 Triode No. 2 | 14Z3 | 12.6 | JR-0203-0 | 0 | 43 | P3 | ..... | ..... |  |  |
| 12SX7 | 12.6 | JX-2103-5 | 21 | Low Sig. | P4 | 1640 | Triode No. 2 | 15 | 2.0 | JR-0234-0 | 22 | ... | P4 | 390 | Cap=G Plate No. 1 | | |
| 12SY7 | 12.6 | JX-7346-5 | 21 | ... | P4 | 170 | Ampl. Sect. | 19 | 2.0 | JR-4500-0 | 15 | ... | P4 | 630 | Triode No. 1 Triode No. 2 | | |
| 12SY7 | 12.6 | JX-5346-7 | 21 | ... | P4 | 470 | Osc. Sect. | 19 | 2.0 | JR-3200-0 | 15 | ... | P4 | 630 | ..... |  |  |
| 12Z3 | 12.6 | JR-0203-0 | 0 | 35 | P3 | ..... | Plate No. 1 | 19BG6 | 20.0 | JR-5073-0 | 24 | ... | P4 | 3800 | Cap=P Plate No. 1 | | |
| 12Z5 | 12.6 | JR-0605-0 | 0 | 40 | P3 | ..... | Plate No. 2 | 19J6 | 20.0 | JR-5207-6 | 17 | Low Sig. | P4 | 3350 | Cap=G Plate No. 2 | | |
| 12Z5 | 12.6 | JR-0203-0 | 0 | 40 | P3 | 1650 | ..... | 19J6 | 20.0 | JR-6307-5 | 17 | Low Sig. | P4 | 3350 | Plate No. 2 | | |
| 14A4 | 12.6 | JR-6207-0 | 17 | ... | P4 | 1650 | ..... | 19T8 | 20.0 | EV-8907-6 | 13 | Low Sig. | P4 | 750 | Triode Sect. | | |
| 14A5 | 12.6 | JR-6237-0 | 12 | ... | P4 | 1900 | ..... | 19T8 | 20.0 | EV-0607-1 | 0 | 50 | P1 | ..... | Diode No. 1 Diode No. 2 | | |
| 14A7 | 12.6 | JR-6237-4 | 22 | ... | P4 | 1200 | ..... | 19T8 | 20.0 | EV-0203-7 | 0 | 50 | P1 | ..... | Diode No. 3 Diode No. 4 | | |
| 14AF7 | 12.6 | JR-5607-0 | 0 | ... | P4 | 1570 | ..... | RK20A | 7.5 | JR-3024-0 | 0 | ... | P4 | 1600 | Cap=P Cap=G | | |
| 14AF7 | 12.6 | JR-4302-0 | 0 | ... | P4 | 1570 | Triode Sect. | 22 | 3.0 | JR-0230-0 | 45 | ... | P4 | 315 | Cap=G Cap=G | | |
| 14B6 | 12.6 | JR-3207-0 | 0 | ... | P4 | 700 | ..... | 24A | 2.5 | JR-0234-0 | 12 | ... | P4 | 630 | Cap=G Cap=G | | |
| 14B6 | 12.6 | JR-0607-2 | 0 | 0 | P1 | ..... | Diode No. 1 | 25A6 | 7.5 | JR-3200-0 | 30 | ... | P4 | 1260 | ..... |  |  |
| 14B6 | 12.6 | JR-0507-2 | 0 | 0 | P1 | ..... | Diode No. 2 | 25A7 | 25.0 | JR-5347-0 | 43 | ... | P4 | 1450 | ..... |  |  |
| 14B8 | 12.6 | JR-6257-4 | 27 | ... | P4 | 630 | Pent. Sect. | 25A7 | 25.0 | JR-5347-6 | 50 | ... | P4 | 1130 | Pent. Sect. Rect. Sect. | | |
| 14B8 | 12.6 | JR-4357-6 | 18 | ... | P4 | 315 | Osc. Sect. | 2325 | 25.0 | JR-0602-3 | 0 | 50 | P3 | ..... | ..... |  |  |
| 14C5 | 12.6 | JR-6237-0 | 23 | ... | P4 | 990 | ..... | 25AC5 | 25.0 | JR-5307-0 | 0 | ... | P4 | 950 | ..... |  |  |
| 14C7 | 12.6 | JR-6237-4 | 20 | Low Sig. | P4 | 1130 | Triode Sect. | 25B5 | 25.0 | JR-4235-0 | 0 | ... | P4 | 1570 | ..... |  |  |
| 14E6 | 12.6 | JR-3207-0 | 12 | ... | P4 | 14E6 | Diode No. 1 | 25B6 | 25.0 | JR-5347-0 | 52 | ... | P4 | 2500 | ..... |  |  |
| 14E6 | 12.6 | JR-0607-2 | 12 | 0 | P1 | 14E6 | Diode No. 2 | 25B8 | 25.0 | JR-0342-0 | 22 | ... | P4 | 1260 | ..... |  |  |
| 14E6 | 12.6 | JR-0507-2 | 12 | 0 | P1 | 820 | Pent. Sect. | 25B8 | 25.0 | JR-7506-0 | 10 | ... | P4 | 950 | Triode Sect. | | |
| 14E7 | 12.6 | JR-6257-0 | 24 | ... | P4 | 14E7 | Diode No. 1 | 25C6 | 25.0 | JR-5347-0 | 37 | ... | P4 | 4400 | ..... |  |  |
| 14E7 | 12.6 | JR-0407-2 | 24 | 0 | P1 | 14E7 | Diode No. 2 | 25D8 | 25.0 | JR-0342-0 | 18 | ... | P4 | 1200 | ..... |  |  |
| 14F7 | 12.6 | JR-0307-2 | 24 | 0 | P1 | 14F7 | ..... | 25D8 | 25.0 | JR-5602-0 | 0 | 0 | P1 | 700 | Triode Sect. | | |
| 14F7 | 12.6 | JR-5607-3 | 0 | ... | P4 | 1000 | ..... | 25D8 | 25.0 | JR-5702-0 | 0 | 0 | P1 | 4100 | Diode Sect. | | |
| 14F8 | 12.6 | HS-4302-6 | 0 | ... | P4 | 3150 | Triode No. 1 | 25L6 | 25.0 | JR-5347-2 | 30 | ... | P4 | 1570 | ..... |  |  |
| 14F8 | 12.6 | HS-8605-0 | 10 | Low Sig. | P4 | 3150 | Triode No. 2 | 25N6 | 25.0 | JR-5347-0 | 30 | ... | P4 | 1570 | | | |
| 14F8 | 12.6 | HS-1304-0 | 10 | Low Sig. | P4 | 10 | | 25N6 | 25.0 | JR-5347-0 | 30 | ... | P4 | 1570 | | | |

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TV-3/U

TABLE 4-3 (Continued)

| Tube Type | Fil Volts | Selectors | Mut. Cond. | Notations | Tube Type | Fil Volts | Selectors | Mut. Cond. | Notations | Tube Type | Fil Volts | Selectors | Mut. Cond. | Notations | |
|-----------|-----------|-----------|------------|-----------|-----------|--------------|---------------|------------|-----------|-----------|-----------|-----------|------------|-----------------------------------|-----------------------------------|
| 25T | 6.3 | JR-3000-0 | 0 | P4 | 630 | Cap = P | 38 | 6.3 | JR-0234-0 | 39 | ... | P4 | 660 | Cap = G | |
| 25W4 | 25.0 | JX-0503-0 | 0 | P3 | 72 | ... | 40 | 6.3 | JR-0234-0 | 28 | ... | P4 | 630 | Cap = G | |
| 25Y5 | 25.0 | JR-0504-0 | 0 | P3 | 40 | ... | 40 | 5.0 | JR-3200-0 | 32 | ... | P4 | 125 | Short on 1-2-3-4-5 Rect. Sect. | |
| 25Y5 | 25.0 | JR-0203-0 | 0 | P3 | 40 | ... | 40 | BLST | JR-0537-0 | 0 | ... | P3 | 1000 | Rect. Sect. | |
| 25Z5 | 25.0 | JR-0504-0 | 0 | P3 | 40 | ... | 40 | 50.0 | JR-0507-0 | 60 | ... | P4 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 25Z5 | 25.0 | JR-0203-0 | 0 | P3 | 40 | ... | 40 | 6.3 | JR-4235-0 | 34 | ... | P4 | 1000 | Rect. Sect. | |
| 25Z5MG | 25.0 | JR-0507-0 | 0 | P3 | 40 | ... | 40 | 6.3 | JR-4235-0 | 29 | ... | P4 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 25Z5MG | 25.0 | JR-0304-0 | 0 | P3 | 40 | ... | 40 | 25.0 | JR-4235-0 | 43 | ... | P4 | 1450 | Short on 1-2-3-4-5 Rect. Sect. | |
| 25Z6 | 25.0 | JR-0507-2 | 0 | P3 | 40 | ... | 40 | 2.5 | JR-3200-0 | 61 | ... | P4 | 1170 | Short on 1-2-3-4-5 Rect. Sect. | |
| 25Z6 | 25.0 | JR-0304-2 | 0 | P3 | 40 | ... | 40 | 50.0 | HT-0208-0 | 0 | ... | P3 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26 | 1.5 | JR-3200-0 | 43 | ... | P4 | 725 | 45Z3 | BLST | JR-0537-0 | ... | ... | P3 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26A6 | 25.0 | JR-3567-2 | 9 | ... | P4 | 2500 | 45Z5 | 50.0 | JR-0507-0 | 0 | ... | P3 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26A7 | 25.0 | JW-2701-0 | 10 | P5 | 67 | ... | 46 | 2.5 | JR-3240-0 | 30 | ... | P4 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26A7 | 25.0 | JW-3401-0 | 10 | P5 | 67 | ... | 47 | 2.5 | JR-3240-0 | 22 | ... | P4 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26C6 | 25.0 | JR-3702-0 | 18 | P4 | 1200 | Triode Sect. | 48 | 25.0 | JR-4235-0 | 58 | ... | P4 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26C6 | 25.0 | JR-3602-0 | 18 | P1 | ... | Diode No. 1 | 49 | 2.5 | JR-3240-0 | 49 | ... | P4 | 710 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26D6 | 25.0 | JR-3502-0 | 18 | P1 | ... | Diode No. 2 | 50 | 7.5 | JR-3200-0 | 61 | ... | P4 | 950 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26D6 | 25.0 | JR-7562-3 | 11 | P4 | 900 | Ampl. Sect. | 50A5 | 50.0 | JR-6237-0 | 30 | ... | P4 | 4750 | Short on 1-2-3-4-5 Rect. Sect. | |
| 26D6 | 25.0 | JR-3562-7 | 0 | P4 | 1000 | Osc. Sect. | 50B5 | 50.0 | JR-3562-0 | 23 | ... | P4 | 4750 | Short on 1-2-3-4-5 Rect. Sect. | |
| 27 | 2.5 | JR-3204-0 | 41 | ... | P4 | 630 | 50C5 | 50.0 | JR-2763-0 | 23 | ... | P4 | 4750 | Short on 1-2-3-4-5 Rect. Sect. | |
| 28D7 | 25.0 | JR-7536-2 | 13 | Low Sig. | P4 | 2150 | Pentode No. 1 | 50C6 | 50.0 | JR-5347-2 | 44 | ... | P4 | 4400 | Short on 1-2-3-4-5 Rect. Sect. |
| 28D7 | 25.0 | JR-2436-7 | 13 | Low Sig. | P4 | 2150 | Pentode No. 2 | 50L6 | 50.0 | JR-5347-0 | 30 | ... | P4 | 4100 | Short on 1-2-3-4-5 Rect. Sect. |
| 30 | 2.0 | JR-3200-0 | 40 | ... | P4 | 570 | 50X6 | 50.0 | JR-0607-5 | 0 | 55 | P3 | 1260 | Plate No. 1 | |
| 31 | 2.0 | JR-3200-0 | 65 | ... | P4 | 580 | 50X6 | 50.0 | JR-0302-5 | 0 | 55 | P3 | 1260 | Plate No. 2 | |
| 32 | 2.0 | JR-0230-0 | 37 | ... | P4 | 400 | Cap = G | 50Y6 | 50.0 | JR-0507-0 | 0 | 55 | P3 | 1260 | Plate No. 1 |
| 32L7 | 35.0 | JR-5347-0 | 22 | ... | P4 | 3000 | Ampl. Sect. | 50Y6 | 50.0 | JR-0304-0 | 0 | 55 | P3 | 1260 | Plate No. 2 |
| 32L7 | 35.0 | JR-0602-3 | 0 | P3 | 50 | ... | Rect. Sect. | BLST | JR-0060-0 | ... | ... | P3 | 1260 | Short on 1-2-3-4-5 Rect. Sect. | |
| 33 | 2.0 | JR-3240-0 | 35 | ... | P4 | 900 | Triode No. 1 | 50Y7 | 50.0 | JR-0507-0 | 0 | 55 | P3 | 1260 | Plate No. 1 |
| RK33 | 6.3 | JR-4506-0 | 17 | ... | P4 | 860 | Triode No. 2 | 50Y7 | 50.0 | JR-0304-0 | 0 | 55 | P3 | 1260 | Plate No. 2 |
| RK33 | 6.3 | JR-0302-0 | 17 | ... | P4 | 860 | Triode No. 2 | 50Z7 | BLST | JR-0060-0 | ... | ... | P3 | 1260 | Short on 1-2-3-4-5 Rect. Sect. |
| 34 | 2.0 | JR-0230-0 | 33 | ... | P4 | 380 | Cap = G | 50Z7 | 50.0 | JR-0507-0 | 0 | 55 | P3 | 1260 | Plate No. 1 |
| 35 | 2.5 | JR-0234-0 | 24 | ... | P4 | 650 | Cap = G | 50Z7 | 50.0 | JR-0304-0 | 0 | 55 | P3 | 1260 | Plate No. 2 |
| 35A5 | 35.0 | JR-6237-0 | 33 | ... | P4 | 3700 | HD-51 | 51/51S | ... | KR-0302-0 | 0 | 0 | P2 | 640 | Cap = G |
| 35B5 | 35.0 | JR-3562-0 | 34 | ... | P4 | 2830 | ... | ... | 2.5 | JR-0234-0 | 24 | ... | P4 | 1500 | Triode No. 1 |
| 35C5 | 35.0 | JR-2763-0 | 34 | ... | P4 | 2830 | ... | ... | 6.3 | JR-3240-0 | 33 | ... | P4 | 950 | Triode No. 2 |
| 35L6 | 35.0 | JR-5347-0 | 39 | ... | P4 | 3650 | ... | ... | 2.5 | JR-5604-2 | 12 | ... | P4 | 950 | Triode Sect., Cap = G |
| 35W4 | 35.0 | JR-0367-0 | ... | ... | P3 | ... | ... | ... | 2.5 | JR-3204-6 | 12 | ... | P4 | 610 | Triode Sect., Cap = G |
| 35Y4 | 35.0 | JR-0507-0 | 0 | 55 | P3 | ... | ... | ... | 2.5 | JR-0205-0 | 39 | ... | P1 | ... | Diode No. 1 |
| 35Y4 | 35.0 | JR-0247-0 | 0 | 55 | P3 | ... | ... | ... | 2.5 | JR-0405-0 | 39 | 0 | P1 | ... | OK over 500 |
| 35Z3 | 35.0 | JR-0207-0 | 0 | 60 | P3 | ... | ... | ... | 2.5 | JR-0305-0 | 39 | 0 | P1 | ... | Diode No. 2 |
| 35Z4 | 35.0 | JR-0507-0 | 0 | 60 | P3 | ... | ... | ... | 2.5 | JR-3204-0 | 29 | ... | P4 | 920 | OK over 500 |
| 35Z5 | 35.0 | JR-0537-0 | 0 | 60 | P3 | ... | ... | ... | 2.5 | JR-0235-4 | 21 | ... | P4 | 770 | Cap = G |
| 35Z5 | 35.0 | JR-0507-0 | 0 | 60 | P3 | ... | ... | ... | 6.3 | JR-0235-4 | 21 | ... | P4 | 770 | Cap = G |
| 35Z6 | 35.0 | JR-0304-0 | 0 | 60 | P3 | ... | ... | ... | 2.5 | JR-0235-4 | 24 | ... | P4 | 900 | Cap = G |
| 35Z6 | 6.3 | JR-0234-0 | 24 | ... | P4 | 660 | Cap = G | 58A/58AS | 6.3 | JR-0235-4 | 24 | ... | P4 | 900 | Cap = G |
| 36 | 6.3 | JR-3204-0 | 41 | ... | P4 | 570 | ... | ... | 59 | ... | ... | ... | P4 | 1260 | Cap = G |

TABLE 4-3 (Continued)

| Tube Type | Fil. Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | Fil. Volts | Type | Tube | Shunt | Bias | Press | Mut. Cond. | Notations |
|-----------|------------|------------|------|----------|-------|------------|---------------------|------------|-----------|------|----------|------|-------|---------------|-----------|
| HY-65 | 6.3 | JR-5040-7 | 0 | ... | P4 | 1900 | Cap=P | 117L7 | JR-4357-0 | 37 | ... | P4 | 2500 | Pent. Sect. | |
| VT-67 | 2.0 | JR-3200-0 | 40 | ... | P4 | 570 | Cap=P | 117L7 | JR-0602-0 | 37 | 61 | P3 | 2500 | Rect. Sect. | |
| HY-69 | 6.3 | JR-3024-0 | 0 | ... | P4 | 1900 | Pent. Sect. | 117M7 | JR-4357-0 | 37 | ... | P4 | 2500 | Pent. Sect. | |
| 70A7 | 75.0 | JR-5347-0 | 50 | ... | P4 | 1900 | {Rect. Sect. | 117M7 | JR-0602-0 | 37 | 61 | P3 | 3150 | Rect. Sect. | |
| 70A7 | 75.0 | JR-0200-0 | 50 | 55 | P3 | 3150 | {Reverse Meter | 117N7 | JR-4356-0 | 37 | ... | P4 | 2500 | Rect. Sect. | |
| 70L7 | 75.0 | JR-5346-0 | 41 | ... | P4 | 1040 | Pent. Sect. | 117N7 | JR-0700-0 | 37 | 75 | P3 | 2500 | Rect. Sect. | |
| 70L7 | 75.0 | JR-0702-3 | 41 | 61 | P3 | 3150 | Rect. Sect. | 117P7 | JR-4356-0 | 37 | ... | P4 | 2500 | Reverse Meter | |
| 71A | 5.0 | JR-3200-0 | 73 | ... | P4 | 470 | Triode Sect., Cap=G | 117P7 | JR-0700-0 | 37 | 61 | P3 | 2500 | Pent. Sect. | |
| 75 | 6.3 | JR-0205-0 | 11 | ... | P4 | 470 | Diode No. 1 | 117Z3 | JR-0506-0 | 0 | 50 | P3 | 2500 | Rect. Sect. | |
| 75 | 6.3 | JR-0405-2 | 11 | 0 | P1 | 470 | Diode No. 2 | 117Z4 | JR-0507-0 | 0 | 67 | P3 | 2500 | Plate No. 1 | |
| 75MG | 6.3 | JR-0305-2 | 11 | 0 | P1 | 470 | Triode Sect., Cap=G | 117Z6 | JR-0507-0 | 0 | 60 | P3 | 2500 | Plate No. 2 | |
| 75MG | 6.3 | JR-0407-0 | 11 | ... | P4 | 470 | Diode No. 1 | 117Z6 | JR-0304-0 | 0 | 60 | P3 | 2500 | Plate No. 1 | |
| 75MG | 6.3 | JR-0507-0 | 11 | 0 | P1 | 470 | Diode No. 2 | 117Z6 | JR-0300-0 | 46 | ... | P4 | 630 | Plate No. 2 | |
| 76 | 6.3 | JR-0607-0 | 11 | 0 | P1 | 900 | Cap=G | C182 | JR-3200-0 | 79 | ... | P4 | 950 | Cap=G | |
| 77 | 6.3 | JR-3204-0 | 29 | ... | P4 | 770 | Cap=G | C182A | JR-3200-0 | 58 | ... | P4 | 950 | Cap=G | |
| 78 | 6.3 | JR-0235-4 | 21 | Low Sig. | P4 | 900 | Cap=G | 182B | JR-3200-0 | 79 | ... | P4 | 950 | Cap=G | |
| 79 | 6.3 | JR-0235-4 | 24 | ... | P4 | 630 | Triode No. 1, Cap=G | 183 | JR-3200-0 | 34 | ... | P4 | 920 | Triode No. 2 | |
| 79 | 6.3 | JR-0504-0 | 15 | ... | P4 | 630 | Triode No. 2 | 205F | JR-3200-0 | 34 | ... | P4 | 340 | Plate No. 1 | |
| 80 | 5.0 | JR-3204-0 | 15 | ... | P3 | ... | Plate No. 1 | 231D | JR-3200-0 | 49 | ... | P4 | 570 | Plate No. 2 | |
| 80 | 5.0 | JR-0300-0 | 0 | 20 | P3 | ... | Plate No. 1 | 244A | JR-3204-0 | 42 | ... | P4 | 460 | Cap=G | |
| 80 | 5.0 | JR-0200-0 | 0 | 15 | P3 | ... | Plate No. 2 | 245A | JR-0234-0 | 55 | ... | P4 | 580 | Cap=G | |
| 81 | 7.5 | JR-0200-0 | 0 | 6 | P1 | ... | Plate No. 1 | 247A | JR-3204-0 | 33 | ... | P4 | 1140 | Pent. Sect. | |
| 82 | 2.5 | JR-0300-0 | 0 | 67 | P3 | ... | Plate No. 2 | T251 | JR-5347-6 | 50 | ... | P4 | 340 | Rect. Sect. | |
| 82 | 2.5 | JR-0200-0 | 0 | 61 | P3 | ... | Plate No. 1 | T251 | JR-0602-3 | 0 | 50 | P3 | 340 | Cap=G | |
| 83 | 5.0 | JR-0300-0 | 0 | 70 | P3 | ... | Plate No. 2 | 257A | JR-0200-0 | 49 | ... | P4 | 1100 | Cap=G | |
| 83 | 5.0 | JR-0200-0 | 0 | 65 | P3 | ... | Plate No. 1 | 259A | JR-0234-0 | 33 | ... | P4 | 1000 | Cap=G | |
| 83V | 5.0 | JR-0300-0 | 0 | 60 | P3 | ... | Plate No. 2 | 262B | JR-0203-0 | 31 | ... | P4 | 365 | Cap=G | |
| 83V | 5.0 | JR-0200-0 | 0 | 60 | P3 | ... | Plate No. 1 | 264B | JR-3200-0 | 49 | ... | P4 | 365 | Plate No. 2 | |
| 84 | 6.3 | JR-0304-0 | 0 | 35 | P3 | ... | Plate No. 1 | 264C | JR-3200-0 | 54 | ... | P4 | 2900 | Cap=P | |
| 84 | 6.3 | JR-0204-0 | 0 | 35 | P3 | ... | Plate No. 2 | 271A | JR-3204-0 | 32 | ... | P4 | 600 | Cap=P | |
| 85 | 6.3 | JR-0205-0 | 39 | ... | P4 | 620 | Triode Sect., Cap=G | 272A | JR-3204-0 | 51 | ... | P4 | 1700 | Plate No. 1 | |
| 85 | 6.3 | JR-0405-2 | 39 | 0 | P1 | ... | Diode No. 1 | 274B | JR-0600-0 | 0 | 20 | P3 | 630 | Cap=G | |
| 85AS | 6.3 | JR-0305-2 | 39 | 0 | P1 | 700 | Triode Sect., Cap=G | 275A | JR-3200-0 | 68 | ... | P4 | 570 | Plate No. 2 | |
| 85AS | 6.3 | JR-0405-2 | 28 | 0 | P1 | 700 | Diode No. 1 | 283A | JR-0234-0 | 40 | ... | P4 | 2900 | Cap=G | |
| 85AS | 6.3 | JR-0305-2 | 28 | 0 | P1 | 980 | Diode No. 2 | 285A | JR-0230-4 | 40 | ... | P4 | 1600 | Cap=P | |
| 89/89Y | 6.3 | JR-0235-4 | 37 | ... | P4 | 270 | Cap=G | 300B | JR-3200-0 | 60 | ... | P4 | 570 | Cap=G | |
| 99 | 3.0 | JR-3200-0 | 55 | ... | P4 | 270 | Plate No. 2 | 307A | JR-3020-4 | 32 | ... | P4 | 1130 | Cap=G | |
| 101D | 4.3 | JR-3200-0 | 55 | ... | P4 | 700 | Triode Sect., Cap=G | 309A | JR-0234-0 | 31 | ... | P4 | 1550 | Cap=G | |
| 101F | 4.3 | JR-3200-0 | 53 | ... | P4 | 700 | Diode No. 1 | 310A | JR-0235-4 | 19 | Low Sig. | P4 | 1950 | Cap=G | |
| 102D | 2.0 | JR-3200-0 | 25 | ... | P4 | 315 | Diode No. 2 | 311A | JR-0234-0 | 38 | ... | P4 | 1500 | Cap=G | |
| 102F | 2.0 | JR-3200-0 | 25 | ... | P4 | 365 | Cap=G | 313CA | AP-8201-0 | 0 | 80 | P5 | 2000 | Cap=P | |
| CK108 | 6.3 | JR-0235-4 | 21 | Low Sig. | P4 | 700 | Triode Sect., Cap=G | 328A | JR-0235-4 | 19 | Low Sig. | P4 | 1130 | Cap=G | |
| 112A | 5.0 | JR-3200-0 | 44 | ... | P4 | 1040 | Diode No. 1 | 329A | JR-0234-0 | 38 | ... | P4 | 1070 | Cap=G | |
| CK113 | 50.0 | JR-5347-6 | 48 | ... | P4 | 1130 | Diode No. 2 | 336A | JR-4235-0 | 10 | Low Sig. | P4 | 1070 | Cap=G | |
| HY-114 | 1.5 | JR-00000-0 | 19 | ... | P4 | 700 | Cap=G | 337A | JR-0235-4 | 21 | Low Sig. | P4 | 2000 | Cap=P | |
| | | | | | | | | 339A | JR-3024-0 | 0 | ... | | | | |

TABLE 4-3 (Continued)

| Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | Fil Volts | Selectors | Bias | Shunt | Press | Mut. Cond. | Notations | |
|-----------|-----------|------------|------|----------|-------|------------|---------------------------|-----------|-----------|-----------|-------|----------|------------|-----------|------------------------------|
| 348A | 6.3 | JR-0347-5 | 19 | Low Sig. | P4 | 1130 | Cap=G | 837 | 12.6 | JR-4036-5 | 0 | ... | P4 | 2500 | Cap=P |
| 349A | 6.3 | JR-5347-0 | 10 | Low Sig. | P4 | 2500 | ... | 841 | 7.5 | JR-3200-0 | 0 | ... | P4 | 630 | ... |
| 350B | 6.3 | JR-5347-0 | 25 | ... | P4 | 3900 | Plate No. 1 | 842 | 7.5 | JR-3200-0 | 61 | Low Sig. | P4 | 750 | ... |
| 351A | 6.3 | JR-0507-2 | 0 | 50 | P3 | ... | Plate No. 2 | 843 | 2.5 | JR-3204-0 | 12 | ... | P4 | 1050 | ... |
| 351A | 6.3 | JR-0307-2 | 0 | 50 | P3 | ... | Triode Sect., Cap=G | 864 | 1.1 | JR-3200-0 | 45 | ... | P4 | 410 | ... |
| 352A | 10.0 | JR-0205-0 | 36 | ... | P4 | 410 | Diode No. 1 | 865 | 7.5 | JR-3020-0 | 34 | ... | P4 | 390 | Cap=P |
| 352A | 10.0 | JR-0405-0 | 0 | 21 | P1 | ... | Diode No. 2 | 866A | 2.5 | JR-0000-0 | 0 | ... | P3 | ... | Cap=P |
| 352A | 10.0 | JR-0305-0 | 0 | 21 | P1 | 3800 | ... | 879 | 2.5 | JR-0000-0 | 0 | ... | P5 | ... | Strikes at approx. 72 |
| 367A | 6.3 | JV-6147-0 | 24 | ... | P4 | 850 | ... | 884 | 6.3 | JR-5307-0 | # | 91 | P5 | ... | ... |
| 373A | 2.0 | JR-4760-3 | 17 | Low Sig. | P4 | 1700 | ... | 885 | 2.5 | JR-3204-0 | 72 | 91 | P5 | ... | ... |
| 374A | 3.0 | JR-4760-2 | 40 | Low Sig. | P4 | ... | 950 | 2.0 | JR-3240-0 | 45 | ... | P4 | 600 | ... | ... |
| 375A | 20.0 | JR-5347-0 | 53 | ... | P4 | 2330 | ... | 951 | 2.0 | JR-0230-0 | 35 | ... | P4 | 400 | Cap=G |
| 381A | 6.3 | HR-0502-0 | 0 | 60 | P1 | ... | ... | 954 | 6.3 | JR-7036-4 | 21 | ... | P4 | 700 | Cap=P |
| 383A | 6.3 | HR-4602-0 | 25 | Low Sig. | P4 | 1770 | ... | 955 | 6.3 | JR-4306-0 | 22 | ... | P4 | 1200 | ... |
| 385A | 6.3 | HR-5032-8 | 15 | Low Sig. | P4 | 1480 | Cap=P | 956 | 6.3 | JR-7036-4 | 17 | ... | P4 | 950 | Cap=P |
| 387A | 6.3 | HR-5032-8 | 15 | Low Sig. | P4 | 2000 | Cap=P | 957 | 1.5 | JR-4300-0 | 28 | ... | P4 | 400 | ... |
| 396A | 6.3 | KR-3402-8 | 17 | Low Sig. | P4 | 3300 | Triode No. 1 | 958 | 1.5 | JR-4300-0 | 41 | ... | P4 | 750 | ... |
| 396A | 6.3 | KR-7608-2 | 17 | Low Sig. | P4 | 3300 | Triode No. 2 | 959 | 1.5 | JR-7030-0 | 28 | ... | P4 | 380 | Cap=P |
| 398A | 6.3 | JR-4760-3 | 37 | ... | P4 | 3350 | ... | FM-1000 | 6.3 | JR-2453-6 | 12 | ... | P4 | 950 | No. 1 Grid |
| 400A | 1.1 | DX-6218-5 | 35 | ... | P4 | 315 | Pent. Sect. | FM-1000 | 6.3 | JR-6453-2 | 12 | ... | P4 | 950 | No. 2 Grid |
| 400A | 1.1 | DX-8216-5 | 35 | ... | P4 | 315 | Osc. Sect. | E1148 | 6.3 | JR-0007-0 | 14 | ... | P4 | 1386 | {Upper Cap=P Lower Cap=G} |
| 401A | 6.3 | JR-35667-0 | 30 | ... | P4 | 1260 | ... | 1201 | 6.3 | JR-1304-0 | 0 | ... | P1 | 1900 | ... |
| 403A | 6.3 | JR-35662-0 | 10 | Low Sig. | P4 | 2750 | ... | 1203 | 6.3 | JR-0407-0 | 30 | ... | P1 | ... | ... |
| 420 | 2.5 | JR-0300-0 | 0 | 70 | P3 | ... | Plate No. 1 | 1204 | 6.3 | HS-5314-0 | 10 | Low Sig. | P4 | 1150 | ... |
| 420 | 2.5 | JR-0200-0 | 0 | 70 | P3 | ... | Plate No. 2 | 1231 | 6.3 | JR-6237-4 | 0 | ... | P4 | 1600 | ... |
| 482A | 5.0 | JR-3200-0 | 79 | ... | P4 | 950 | ... | 1232 | 6.3 | JR-6237-4 | 18 | ... | P4 | 1250 | ... |
| 482B | 5.0 | JR-3200-0 | 57 | ... | P4 | 950 | ... | HY-1269 | 12.6 | JR-3024-0 | 0 | ... | P4 | 2500 | Cap=P |
| 483 | 5.0 | JR-3200-0 | 79 | ... | P4 | 850 | ... | 1273 | 6.3 | JR-6237-4 | 11 | ... | P4 | 1450 | ... |
| 484 | 3.0 | JR-3204-0 | 37 | ... | P4 | 820 | ... | 1280 | 12.6 | JR-6237-4 | 11 | ... | P4 | 1450 | ... |
| 484A | 3.0 | JR-3204-0 | 37 | ... | P4 | 820 | ... | 1284 | 12.6 | JR-6237-4 | 28 | ... | P4 | 1250 | ... |
| 485 | 3.0 | JR-3204-0 | 37 | ... | P4 | 820 | ... | 1285 | 25.0 | JR-5347-0 | 38 | ... | P4 | 3650 | ... |
| 486 | 3.0 | JR-3204-0 | 43 | ... | P4 | 280 | ... | 1291 | 2.5 | JR-6700-0 | 12 | ... | P4 | 950 | Triode No. 1 |
| GL-502 | 6.3 | JR-5367-0 | # | 55 | P3 | ... | Strikes at approx. 70 | 1291 | 2.5 | JR-6230-0 | 37 | ... | P4 | 1300 | ... |
| 629 | 2.5 | JR-3204-0 | # | 25 | P3 | 2200 | Strikes at approx. 73 | 1291 | 2.5 | JR-3200-0 | 21 | ... | P4 | 770 | Cap=G |
| 717A | 6.3 | JR-4763-0 | 0 | ... | P4 | 950 | ... | 1293 | 1.5 | JR-6200-0 | 25 | ... | P4 | 450 | ... |
| 801A | 7.5 | JR-3200-0 | 0 | ... | P4 | 1260 | Cap=P | 1294 | 1.5 | JR-0407-0 | 0 | 0 | P1 | 820 | ... |
| 802 | 6.3 | JR-4036-5 | 22 | ... | P4 | 2400 | Cap=P | 1299 | 2.5 | JR-6230-0 | 37 | ... | P4 | ... | ... |
| 807 | 6.3 | JR-3024-0 | 33 | ... | P4 | 1050 | Cap=P | 1603 | 6.3 | JR-0235-4 | 21 | ... | P4 | 450 | ... |
| 809 | 6.3 | JR-3000-0 | 0 | ... | P4 | 900 | Cap=P | 1609 | 1.1 | JR-3240-0 | 22 | ... | P4 | 410 | Cap Grid, Cap=G |
| 811 | 6.3 | JR-3000-0 | 0 | ... | P4 | 1400 | Cap=P | 1612 | 6.3 | JR-0347-5 | 23 | ... | P4 | 410 | Pin Grid |
| 812 | 6.3 | JR-3000-0 | 0 | ... | P4 | 1900 | Cap=P | 1612 | 6.3 | JR-5347-2 | 27 | ... | P4 | 410 | ... |
| 814 | 10.0 | JR-3024-0 | 0 | ... | P4 | 2500 | Left Cap=P | 1613 | 6.3 | JR-5347-0 | 0 | ... | P4 | 1400 | ... |
| 815 | 12.6 | HS-8043-0 | 40 | ... | P4 | 2500 | Right Cap=P | 1616 | 6.3 | JR-5347-2 | 23 | ... | P4 | 3150 | ... |
| 815 | 12.6 | HS-1043-0 | 35 | ... | P4 | 75 | Cap=P | 1619 | 2.5 | JR-5340-7 | 0 | 6 | P3 | 2150 | Cap=P |
| 816 | 2.5 | JR-0000-0 | 0 | ... | P4 | 1140 | Near Cap=G | 1620 | 6.3 | JR-0347-5 | 22 | ... | P4 | 770 | Cap=G |
| 834 | 7.5 | JR-0000-0 | 0 | ... | P4 | 1140 | Near Cap=G | 1621 | 6.3 | JR-5347-0 | 29 | ... | P4 | 1250 | ... |
| 834 | 7.5 | JR-0000-0 | 0 | ... | P4 | 1140 | {Near Cap=G Far Cap=P} | 1622 | 6.3 | JR-5347-0 | 23 | ... | P4 | 3150 | ... |

TABLE 4-3 (Continued)

| Tube Type | Fil V _o rs | Selectors | Bias | Shunt | Press | Mut Cond. | Notations | Tube Type | Fil Volts | Selectors | Bias | Shunt | Press | Mut Cond. | Notations |
|-----------|-----------------------|-----------|-------|----------|-------|---|-----------------------|-----------|-----------|-----------|----------|----------|-------|-----------------------|-------------------------------------|
| 1623 | 6.3 | JR-3000-0 | 0 | P4 | 1400 | Cap=P | 5691 | 6.3 | JX-2103-5 | 11 | Low Sig. | P4 | 1000 | Triode No. 2 | |
| 1624 | 2.5 | JR-3020-0 | 17 | P4 | 2500 | Cap=P | 5692 | 6.3 | JX-4506-1 | 29 | ..... | P4 | 1250 | Triode No. 1 | |
| 1625 | 12.6 | JR-4036-0 | 33 | P4 | 2000 | Cap=P | 5692 | 6.3 | JX-2103-5 | 29 | ..... | P4 | 1250 | Triode No. 2 | |
| 1626 | 12.6 | JR-5307-0 | 52 | P4 | 1325 | Eye Open | 5693 | 6.3 | JR-4765-3 | 20 | Low Sig. | P4 | 1050 | Triode No. 1 | |
| 1627 | 12.6 | JR-5407-0 | ..... | P4 | ..... | Eye Closed | 5694 | 6.3 | JR-4302-0 | 0 | Low Sig. | P4 | 1500 | Triode No. 2 | |
| 1628 | 12.6 | JR-5437-0 | ..... | P4 | 3150 | ..... | 5694 | 6.3 | JR-5607-0 | 0 | Low Sig. | P4 | 1500 | Triode No. 1 | |
| 1629 | 12.6 | JR-5347-2 | 23 | P4 | 5000 | ..... | 5696 | 6.3 | JR-3602-5 | # | 77 | P3 | ..... | Strikes at approx. 77 | |
| 1631 | 12.6 | JR-5347-0 | 18 | P4 | 5000 | ..... | 5731 | 6.3 | JR-4306-0 | 20 | Low Sig. | P4 | 1400 | ..... |  |
| 1632 | 12.6 | JW-2751-3 | 23 | Low Sig. | P4 | 1650 | Triode No. 1 | 5742 | 4.3 | JR-3200-0 | 10 | | P4 | 530 | |
| 1633 | 25.0 | JX-4506-0 | 23 | Low Sig. | P4 | 1650 | Triode No. 2 | 5763 | 6.3 | EV-9167-3 | 8 | | P4 | 4400 | Upper Cap=G Lower Cap=P Cap=P |
| 1633 | 25.0 | JX-2103-0 | 23 | Low Sig. | P4 | 1650 | Triode No. 1 | 5763 | 6.3 | JR-0007-0 | 0 | | P4 | 1900 | |
| 1634 | 12.6 | JX-4506-2 | 0 | | P4 | 650 | Triode No. 2 | 7193 | 6.3 | JR-0000-0 | 0 | 60 | P5 | | |
| 1634 | 12.6 | JX-3106-2 | 0 | | P4 | 650 | Triode No. 1 | 8016 | 1.1 | JR-0000-0 | 0 | 60 | P5 | | |
| 1635 | 6.3 | JR-4307-0 | 0 | | P4 | 540 | Triode No. 1 | 9001 | 6.3 | JR-3567-0 | 21 | | P4 | 700 | |
| 1635 | 6.3 | JR-5607-0 | 0 | | P4 | 540 | Triode No. 2 | 9002 | 6.3 | JR-6307-0 | 22 | | P4 | 1200 | |
| 1642 | 6.3 | JR-4506-0 | 17 | P4 | 875 | Triode No. 1 | 9003 | 6.3 | JR-3562-0 | 17 | ..... | P4 | 950 | ..... |  |
| 1642 | 6.3 | JR-0302-0 | 17 | P4 | 875 | Triode No. 2, Cap=0 | 9004 | 6.3 | JR-0304-0 | 0 | 55 | P1 | ..... | ..... |  |
| 1644 | 12.6 | JW-2751-3 | 10 | | P4 | 1350 | Pentode No. 1 | 9005 | 4.3 | JR-0403-0 | 0 | 0 | P1 | | |
| 1644 | 12.6 | JW-3451-2 | 10 | | P4 | 1350 | Pentode No. 2 | 9006 | 6.3 | JR-0307-0 | 0 | 24 | P1 | | |
| 1654 | 1.5 | DX-0000-0 | 0 | P2 | ..... | { Reads 500 on Mcter, Short on 3, Cap=P | 38142 | 7.5 | JR-3200-0 | 37 | ..... | P4 | 1400 | ..... |  |
| 1658 | 2.0 | JR-3200-0 | 40 | P4 | 570 | XBX | XXB | 2.5 | BY-5600-0 | 10 | ..... | P4 | 700 | ..... |  |
| 1851 | 6.3 | JR-0347-5 | 10 | Low Sig. | P4 | 3150 | Cap=G | XXD | 2.5 | JR-4300-0 | 10 | | P4 | 700 | Triode No. 2 |
| 1852 | 6.3 | JR-4765-3 | 10 | | P4 | 2850 | XXD | XXD | 12.6 | JR-5607-0 | 13 | Low Sig. | P4 | 1575 | Triode No. 1 |
| 1853 | 6.3 | JR-4765-3 | 0 | | P4 | 2200 | XXFM | XXFM | 12.6 | JR-4302-0 | 13 | Low Sig. | P4 | 1575 | Triode No. 2 |
| 2050 | 6.3 | JR-5367-0 | 60 | P3 | ..... | XXFM | XXFM | 6.3 | JR-3204-0 | 10 | Low Sig. | P4 | 630 | Triode Sect. | |
| 2051 | 6.3 | JR-5367-0 | 60 | P3 | ..... | XXFM | XXFM | 6.3 | JR-0504-0 | 10 | 61 | P1 | ..... | Diode No. 1 | |
| 5516 | 6.3 | JR-5032-0 | 20 | P4 | 2500 | Cap=P, Short on 3 Cap=P | XXL | 6.3 | JR-0607-0 | 10 | 61 | P1 | 1900 | Diode No. 2 | |
| 5517 | 4.3 | AP-0807-0 | 0 | P2 | ..... | ..... | XXL | 6.3 | JR-6207-0 | 18 | Low Sig. | P4 | 1900 | ..... |  |
| 5556 | 4.3 | JR-3200-0 | 26 | P4 | 625 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5591 | 6.3 | JR-3562-0 | 10 | Low Sig. | P4 | 2650 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5603 | 6.3 | JR-4760-3 | 37 | ..... | P4 | 3350 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5618 | 6.3 | DX-6218-0 | 24 | ..... | P4 | 1900 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5651 | 6.3 | AP-0307-0 | 0 | P5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5654 | 6.3 | JR-3562-0 | 10 | Low Sig. | P4 | 2700 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5659 | 12.6 | JR-5347-0 | 22 | ..... | P4 | 1900 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5660 | 12.6 | JR-0367-0 | 8 | ..... | P4 | 840 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5660 | 12.6 | JR-0567-0 | 0 | 0 | P1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5661 | 12.6 | JR-0467-0 | 0 | 0 | P1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5663 | 6.3 | JR-3752-0 | 21 | ..... | P4 | 1250 | Strikes at approx. 76 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5670 | 6.3 | KR-7608-0 | 17 | Low Sig. | P4 | 3300 | Triode No. 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5670 | 6.3 | KR-3402-0 | 17 | Low Sig. | P4 | 3300 | Triode No. 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5679 | 6.3 | JR-0607-5 | 0 | 49 | P1 | ..... | Diode No. 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5679 | 6.3 | JR-0302-5 | 0 | 49 | P1 | ..... | Diode No. 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5687 | 12.6 | EV-7906-1 | 26 | Low Sig. | P4 | 4800 | Triode No. 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5687 | 12.6 | EV-2103-9 | 26 | Low Sig. | P4 | 4800 | Triode No. 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 5691 | 6.3 | JX-4506-1 | 11 | Low Sig. | P4 | 1000 | Triode No. 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |  |

TABLE 4-4. TEST DATA FOR SUB-MINIATURE TUBES

| Tube | Fil. | Basing | Selectors | Bias | Shunt | Press | Min. Mut. Cond. | Notes |
|--------|------|--------|-----------|------|---------------|-------|------------------------------|---------------|
| 1Q6 | 1.1 | F | EV-2780-0 | 30 | Low Sig. 0 | P4 | 200 | Triode Sec. |
| 1Q6 | 1.1 | F | EV-0600-0 | 0 | | P1 | OK over 400 on 3000 scale | Diode Sec. |
| 1W5 | 1.1 | F | EV-2780-0 | 27 | Low Sig. | P4 | 410 | |
| 6K4 | 6.3 | C | DU-2105-0 | 31 | Low Sig. | P4 | 2000 | |
| SN976C | 6.3 | F | DW-1574-0 | 49 | High Sig. | P4 | 2500 | |
| 5633 | 6.3 | E | EW-3051.2 | 15 | Low Sig. | P4 | 1500 | |
| 5634 | 6.3 | E | EW-3051.2 | 17 | Low Sig. | P4 | 1825 | |
| 5637 | 6.3 | C | DU-2105-0 | 17 | Low Sig. | P4 | 950 | |
| 5644 | 6.3 | D | FT-4102-0 | 16 | Low Sig. | P4 | 950 | |
| 5645 | 6.3 | D | FT-4102-0 | 29 | Low Sig. | P4 | 1380 | |

(29) TESTING BALLAST TUBES.

- (a) Turn the tester ON.
- (b) Set FILAMENT voltage switch S101 to BLST.
- (c) Set SHORTS test switch on position 1.
- (d) Refer to TABLE 4-5. Set first SELECTOR switch S103 (lettered A to K) to letter in column headed "First Selector." Set all numbered SELECTORS on zero.
- (e) Rotate second SELECTOR switch S104 (lettered P to Z) from P to Z. Neon lamp, E103, should light on positions noted.

TABLE 4-5. BALLAST TUBE TEST CHART

| TUBE TYPE | First Selector | Neon lamp should light in these positions. | | | | | | | | | |
|---|----------------|--|---|---|--|---|--|--|--|--|---|
| 1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1L1-1N1- 1P1-1Q1-1R1G-1S1G-1T1G-1U1G-1V1-1Y1-1Z1-2 | J | R | | | | | | | | | |
| 2UR224 | J | | | T | | | | | | | X |
| 2LR212 | H | R | S | | | U | | | | | |
| 3 | J | R | | | | | | | | | |
| 03G | J | | | T | | | | | | | |
| 4-5 | J | R | | | | | | | | | |
| 6-133 | J | | | T | | | | | | | |
| 6-6AA | J | R | | | | | | | | | |
| 7-8-9 | J | R | | | | | | | | | |
| 10A-10AG | J | | | T | | | | | | | |

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TV-3/U
BALLAST TUBE TEST CHART (Continued)

| TUBE TYPE | First Selector | Neon lamp should light in these positions. | | | | |
|---|----------------|--|---|---|---|---|
| 10AB | J | | T | | | X |
| K17B-M17C-BM17C | J | | T | | | X |
| M17HG-M17H | J | S | | | | X |
| | D | R | | | | |
| K23B-K23C-KX23B-KX30C | J | | T | | | X |
| M30H | J | S | | | | X |
| | D | R | | | | |
| 30A-K30A | J | | T | | | |
| K30D | J | R | T | | | X |
| 33A-33AG | J | | T | | | |
| K34B | J | | T | | | X |
| 36A | J | | T | | | |
| K36B-BK36B-L36B-BM-L36C-KX36C | J | | T | | | X |
| KX36A | J | R | | | | |
| 36D-L36D | J | R | T | | | X |
| L36DJ | J | R | T | U | | X |
| K36H-M36H-M36HG | J | S | | | | X |
| | D | R | | | | |
| L40S1-L40S2 | J | R | T | | V | |
| 42A | J | | T | | | |
| 42A1 | H | | | U | | |
| 42A2-42B2 | H | | S | U | | |
| K42B-L42B-M42B-KX42B-LX42B-L42BX-K42C-L42C-M42C | J | | | T | | X |
| KB42D-K42D-L42D | J | R | T | | | X |
| LX42D-L42DX | J | R | S | T | | |
| K42E-L42E | J | | | T | | X |
| L42F | U | | | | | X |
| | D | R | | | | |
| 42HA-K42HJ-M42H-M42HG | J | | S | | | X |
| | E | R | T | | | |
| KX42C | J | | T | | | X |

BALLAST TUBE TEST CHART (Continued)

| TUBE TYPE | First Selector | Neon lamp should light in these positions. | | | | |
|--------------------------------|----------------|--|---|---|--|---|
| | J | R | T | | | X |
| K55D-L55D | J | | T | | | X |
| L55E-M55E | J | | T | | | X |
| L55F-M55F-BL55F | J | | | | | X |
| | D | R | | | | |
| | J | | S | | | X |
| K55H-M55H-M55HG | D | R | | | | |
| L55S1-L55S2 | J | R | T | V | | X |
| 60R30G | J | R | T | | | |
| 64.23 | J | | T | | | |
| 67A | J | | T | | | |
| K67B-L67B | J | | T | | | X |
| L73B-K74B-L74B-CX74C | J | | T | | | X |
| 80A | J | | T | | | |
| K79B-K80B-M80B-K80C-KX80B-L80B | J | | T | | | X |
| | J | | T | | | X |
| K80F | D | R | | | | |
| KX87B-LX87B-L90B | J | | T | | | X |
| | J | | | | | X |
| K90F-M90F-K92F-M92F | D | R | | | | |
| 92A | J | | T | | | |
| L92B-95K2 | J | | T | | | X |
| L99D | J | R | T | | | X |
| 100R8 | J | | T | | | X |
| 120R | J | R | | | | |
| 120RS-135K1 | J | | T | | | X |
| 135K1A | J | | T | U | | X |
| 140L4-140L8-140R4-140R8 | J | R | T | | | |
| 140R | J | R | S | T | | |
| 140L44-140R44 | J | R | T | | | |
| 165L4-165R4-165R8 | J | R | S | T | | |
| 165R | J | R | T | | | |
| 165L44-165R44 | J | R | S | T | | |
| 185L4-185L8-185R4-185R8 | J | R | T | | | |
| 185R | J | R | S | T | | |
| 185L44-185R44 | J | R | T | | | |
| 200R-250R | J | R | S | T | | |
| 250R8-290L4 | J | | T | | | X |
| 300R4-320R4 | J | | T | | | X |
| 340 | J | R | | | | |
| 808-1 | J | | T | U | | X |
| E14980-W43357-W4588-3613 | J | | T | | | X |
| 3334-3334A | J | R | T | | | X |
| 8593-8598-8601-8664 | J | | T | | | X |
| 3ER248 | J | R | T | U | | X |
| 3CR241 | J | R | T | | | X |

| TUBE TYPE | First Selector | Neon lamp should light in these positions. | | | | |
|--|----------------|--|---|---|---|---|
| | | R | T | V | U | X |
| L42S1 | J | | | | | |
| 49A-49AJ-K49AJ | J | | T | | | |
| KX49A | J | | T | | | X |
| 49A1 | H | | | U | | |
| 49A2-49B2 | H | S | U | | | |
| K49B-L49B-M49B-BM49B-K49C-M49C-BM49C-BK49C-K49E-L49E | J | | T | | | X |
| K49D-BK49D-L49D | J | | T | | | X |
| L49F | J | | | | | X |
| | D | R | | | | |
| M49H-M49HG | J | | S | | | X |
| | D | R | | | | |
| KZ49B-KZ49C | J | R | | V | | |
| K49BJ-L49BJ | J | | T | U | | X |
| L49S2 | J | R | T | V | | |
| 49AJ-K49AJ | J | | T | | | |
| KX49B-LX49B-LX49C | J | | T | | | X |
| L49DJ | J | R | T | U | | X |
| L49S3 | J | R | T | V | | |
| 50A2 | J | R | T | | | |
| 50A2MG-50B2 | J | R | | V | | |
| 50X3 | J | R | | | | |
| K52H-M52H | J | | S | | | X |
| | D | R | | | | |
| K54B | J | | T | | | X |
| 55A-K55A | J | | T | | | |
| 55A1 | H | | | U | | |
| KX55A | J | R | | | | |
| 55B-K55B-M55B-BM55B-L55BG-LX55B | J | | T | | | X |
| 55A2-55B2 | H | | S | U | | |
| K55C-L55C-KX55C | J | | T | | | X |
| K55CP | J | | T | V | | X |

b. When the Tube Tester TV-3 U is used as a Multimeter to measure VOLTS, A.C. or D.C., OHMS, D.C. MILLIAMPERES, AND MICROFARADS, the eleven position MASTER SWITCH, S112, in the upper right of the main panel is used to select the range used in making measurements. It switches the indicating meter into different circuits. The METER, M101, has a sensitivity of 200 microamperes and an internal resistance of 2365 ohms.

Toggle switch S114 connects the copper oxide rectifier CR101 in the meter circuit for A.C. and CAPACITY and disconnects it for D.C.

The two jacks J103 and J104 just above the meter are used when measuring VOLTS, OHMS, MILLIAMPERES or CAPACITY. The RED jack J104 is positive when dc measurements are made.

The different scales on the meter dial are shown in distinctive colors. The points on the MASTER SWITCH are shown in corresponding colors. Thus OHMS are shown in ORANGE, VOLTS and MILS are shown in RED and CAPACITY is shown in GREEN. This makes it easy to select the meter scale to be read when making measurements.

(1) VOLTS D.C. When measuring volts the circuit has a sensitivity of 1000 ohms per volt. Ranges are 0 to 20, 0 to 200, 0 to 500, and 0 to 1000.

(a) Set the MASTER SWITCH S112 to the appropriate range.

(b) Set the toggle switch S114 at the left of the meter to D.C.

(c) Insert the test leads W104 and W105 into the jacks J103 and J104 at the upper right hand corner of the main panel. The RED jack and the RED lead are POSITIVE.

(2) VOLTS A.C. The sensitivity of the circuit is 1000 ohms per volt. Ranges are the same as for D.C. VOLTS.

(a) Set the MASTER SWITCH, S112, to the appropriate range the same as for dc volts.

(b) Set the toggle switch, S114, to A.C. and CAP.

(c) Insert the test leads W104 and W105 into the jacks, J103 and J104, at the upper right hand corner of the main panel. In measuring ac the polarity does not matter.

(3) OHMS. Ohms are measured in two overlapping ranges, the center scale readings of which are respectively 2,000 and 200,000 ohms. No batteries are used as the power is obtained from the built-in power supply. Therefore, when measuring ohms the power

switch, S106, must be turned on.

When the MASTER SWITCH is set on OHMS X1 the ohms scale reads direct. The center of the scale is 2,000 ohms and may be read from 10 ohms to 1 megohm.

When the MASTER SWITCH is set on OHMS X100 the scale is multiplied by 100. The center of the scale is 200,000 and may be read from 1000 ohms to 100 megohms.

TO OPERATE:

(a) Set the MASTER SWITCH S112 on the appropriate point. (OHMS X1 or OHMS X100)

(b) Plug the line cord of the tester into a 115 volt ac outlet and turn the power switch, S106, ON.

(c) The pointer of the meter will move to the top of the scale.

(d) Turn the knob of LINE ADJUST R113 until the meter pointer rests exactly over the end of the scale marked INF. (infinity).

(e) Insert the test leads, W104 and W105, in the two jacks, J103 and J104, in the upper right hand corner of the panel marked VOLTS, OHMS, MILS, CAP.

(f) Touch the prods of the test leads to the terminals of the resistance to be measured. The meter pointer will indicate the resistance in ohms. The resistance being measured should not be shunted by any other resistance, capacitance, or inductance.

(4) CAPACITY—.05 Mfd. or higher. Capacity is measured in two ranges, 0-5 and 0-50 microfarads. It is necessary to apply a standard voltage to the capacitor being measured, therefore:

(a) Turn the MASTER SWITCH, S112, to OHMS X100 and turn knob of LINE ADJUST R113 to bring the meter pointer to the INF. mark. This establishes standard voltage across the capacitor.

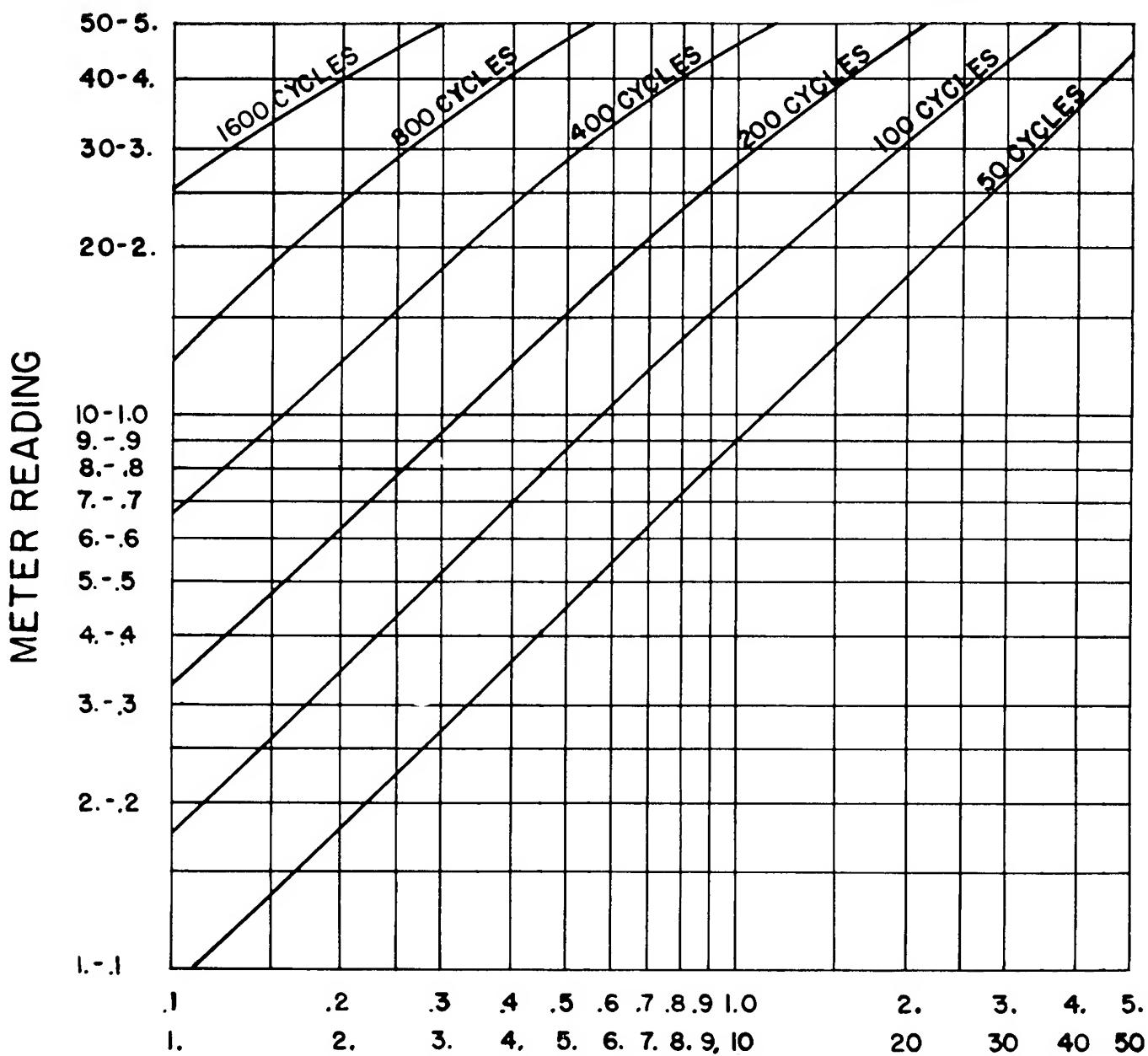
(b) Turn the MASTER SWITCH, S112, to the appropriate point (5 MFD. or 50 MFD.).

(c) Set the toggle switch S114 to CAP.-A.C.

(d) Insert the test leads, W104 and W105, in the two jacks, J103 and J104, marked VOLTS, OHMS, MILS, CAP.

(e) Touch the prods of the test leads to the terminals of the capacitor being measured. The pointer of the meter will indicate the value of the capacitance in microfarads. The capacitor being measured should not be shunted by other capacitance, resistance, or inductance.

(f) The capacity scale is calibrated for use on 60 cycles. For other power line frequencies consult the conversion chart, Figure 4-5.



TRUE CAPACITY

Fig. 4-5. Conversion Chart for Capacity Measurements at Frequencies Other Than 60 Cycles

(5) TO CHECK SMALL CAPACITORS. Capacitors from .0001 to .05 M.F. may be checked as follows:

(a) Make line adjustment the same as for tube testing. See paragraphs 4a(4) and 4a(5), page 4-3.

(b) Set the master switch S112 to CAPS on Volts 200. Set toggle switch S114 to A.C.-CAP.

(c) Set SELECTORS to JR-0204-0.

(d) Furnished with the TV-3 U is a special capacity test cable, W102. One end of this cable is

equipped with a 5 pin plug. The black wire terminates in a pin tip. The red wire terminates in an alligator clip.

(e) Insert the 5 pin plug of W102 in the 5 pin tube test socket. Insert the pin tip in the black pin jack J103 in the upper right corner of the panel.

(f) Connect the alligator clip of W102 to one terminal of the capacitor to be measured. Insert the red test lead W104 in the red pin jack J104, and hold the prod on the other terminal of the capacitor.

(g) Press button marked P5 and note the reading of the voltmeter. The value of the capacitor is found in Table 4-6 below.

TABLE 4-6. CAPACITY TO VOLTAGE CONVERSION TABLE FOR SMALL CAPACITORS

| CAPACITY IN M.F. | VOLTMETER READING ON 200 VOLT SCALE |
|-----------------------------|--|
| .0001 | 1.5 Volts |
| .0002 | 3. " " |
| .00025 | 3.5 " |
| .0005 | 7. " |
| .001 | 13. " |
| .002 | 25. " |
| .003 | 37. " |
| .004 | 49. " |
| .005 | 59. " |
| .006 | 70. " |
| .007 | 79. " |
| .008 | 85. " |
| .009 | 92. " |
| .01 | 99. " |
| .015 | 125. " |
| .02 | 139. " |
| .025 | 147. " |
| .03 | 153. " |
| .035 | 156. " |
| .04 | 160. " |
| .05 | 162. " |

(6) MILLIAMPERES, D.C. Milliamperes D.C. are measured in two ranges, 0-20 and 0-200.

(a) Turn the power switch S106 to OFF position.

(b) Turn the MASTER SWITCH S112 to the appropriate MILS range.

(c) Connect the current being measured to the jacks, J103 and J104, marked VOLTS, OHMS, MILS, CAP., by means of test leads W104 and W105.

(d) The RED jack is positive.

(7) INDUCTANCE. In measuring inductance of choke coils make switch settings exactly as for measuring capacity. (See paragraph 4b(4) of this section.)

(a) Set the MASTER SWITCH, S112, on CAP. 5 MFD.

(b) Connect the prods to the terminals of the choke being measured and read the microfarad scale of the meter.

(c) Divide the reading in microfarads into 7.04, which will give the results in henries.

(d) The following is a conversion table for inductance values:

**TABLE 4-7. CONVERSION FROM CAPACITY READING
TO INDUCTANCE**

| CAPACITY READING M.F. | INDUCTANCE HENRIES |
|----------------------------------|-------------------------------|
| .1 | 70.4 |
| .2 | 35.2 |
| .3 | 23.4 |
| .4 | 17.6 |
| .5 | 14.1 |
| .6 | 11.7 |
| .7 | 10.1 |
| .8 | 8.8 |
| .9 | 7.8 |
| 1.0 | 7.0 |

SECTION 5

OPERATOR'S MAINTENANCE

1. LINE CORD AND PLUG.

a. Inspect cord for cuts or breaks in the insulation. Minor damage to the outer jacket may be repaired with friction tape. If, however, the break or cut is deep enough to expose either of the conductors, the cord should be replaced.

b. If the panel indicator I110 does not light when the Tube Tester TV-3/U is connected to a live 105-125 volt ac 50-1600 cycle outlet (see paragraph c below), check the FUSE lamp E102 for possible burn out or loose socket connection. If FUSE lamp is OK unscrew the red jewel of indicator I110 and check pilot lamp E101 for loose socket connection, or burn out.

c. To check ac voltage source use the 200 volt ac range of the Multimeter section.

2. TEST LEADS.

a. Inspect test leads for worn or broken insulation, also check all leads for continuity, using the OHMS X1 range of the Multimeter section. If leads are badly damaged or open they should be replaced.

3. FUSE LAMP.

a. E102, a type 81, Mazda lamp, is used as a fuse and overload indicator. Two spare lamps are supplied as operating spares, and are kept in the lead compartment.

4. PILOT LAMP.

a. A number 47 lamp 6.3 volts at .15 amps., E101, serves as a pilot lamp in panel indicator I110. A spare lamp is supplied with the operating spares kept in the lead compartment.

5. NEON LAMP.

a. The neon lamp E103 used as a short indicator should be checked as follows:

- (1) Be sure lamp is firmly screwed into its socket.
- (2) With the tester plugged in, and the power switch ON, but with no tube in test sockets, set the MASTER switch S112 to TUBE TEST.
- (3) Set SELECTORS to JR-1111-1.
- (4) Turn the SHORTS test switch S113 through

positions 1, 2, 3, 4, and 5. The neon lamp should glow in positions 2 and 3.

b. If the neon lamp is defective replace it from the operating spares in the lead compartment.

Note

Do not deplete the supply of operating spares furnished with the tester without taking the necessary steps to secure replacements.

6. TUBES.

a. Two full wave rectifier tubes are used in the TV-3/U. One type 83 V101 used in the mutual conductance test circuit to supply dc plate voltage for the tube under test and dc voltage for the ohmmeter portion of the Multimeter. The type 5Y3, V102, supplies screen and bias voltages to the tube under test.

b. Failure of the 83 tube V101 is indicated if, with no tube in the test sockets but the controls set for tube test, the pointer of the METER M101 moves sharply off scale to the right when the G_m push button P4 is pressed.

c. Failure of the type 5Y3GT tube would result in lack of voltage on the screen, and bias circuits of the tube under test. To check plate and screen voltages refer to Section 7, paragraph 7.

d. To remove rectifier tubes V101 and V102 for test or replacement:

- (1) Remove the ten mounting screws around the edge of the panel.
- (2) Carefully lift the entire unit out of its case and turn face down on the test bench or other flat surface.
- (3) Slide the spring clamps holding the tubes in place away from the top of the tube, and to one side.

Note

After tubes are replaced in their sockets, BE SURE THE TUBE CLAMPS ARE IN PLACE BEFORE THE EQUIPMENT IS RETURNED TO ITS CASE.

SECTION 6

PREVENTIVE MAINTENANCE

Note

"THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE 'BUREAU OF SHIPS MANUAL' OF THE LATEST ISSUE."

1. PRECAUTIONARY MEASURES.

- a.* The following precautions should be observed when operating the Tube Tester TV-3/U:
 - (1) DON'T connect the TV-3/U into a dc power supply line. Be sure the power line to be used supplies 105 to 125 volts ac at a frequency between 50 and 1600 cycles.
 - (2) DON'T insert a tube in any of the test sockets without first properly adjusting the controls.
 - (3) DON'T attempt to test tubes for emission, or mutual conductance, without first checking for shorted elements.
 - (4) DON'T press the mutual conductance G_m push button P4 when testing rectifier tubes.
 - (5) DON'T fail to turn off the equipment and return all leads and adapters to the lead compartment when through using it.

FAILURE REPORTS

A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause

of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards and envelopes on board. They may be obtained from any Electronics Officer.

| | | | |
|---|--|--|--|
| FAILURE REPORT—ELECTRONIC EQUIPMENT <small>NAVSHIPS (NBS) 383 (REV. 8-45) (FORMERLY NAVSHIPS 1883) AND NAVSHIPS (NBS) 383 SHIP NUMBER AND NAME OR STATION</small> | | <small>NOTICE—Read notes on reverse side. Add hand forms and envelopes must be obtained from nearest EAO.</small> | |
| <small>CHECK ONE:</small> <input type="checkbox"/> RADIO <small>EQUIPMENT MODEL DESIGNATION</small> <small>TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED</small> <small>TUBE TYPE, INCLUDING PREFIX LETTERS</small> <small>TUBE MANUFACTURER</small> <small>FAILURE OCCURRED IN:</small> <input type="checkbox"/> Storage <input type="checkbox"/> Operation <input type="checkbox"/> Handling <input type="checkbox"/> Other (Specify) <input type="checkbox"/> Installing <input type="checkbox"/> Other (Specify) <small>NATURE OF FAILURE AND REMARKS</small> | | <small>NAME OF PERSON MAKING REPORT</small> <small>DATE</small> <small>REPORT NO.</small> <small>NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE</small> <small>NOTICE—Read notes on cover prior to preparing this form.</small> <small>ORGANIZATION PERFORMING MAINTENANCE</small> <small>EQUIPMENT INVOLVED</small> <input type="checkbox"/> Navy <input type="checkbox"/> Army <input type="checkbox"/> USMC <input type="checkbox"/> JAN <input type="checkbox"/> Commercial <input type="checkbox"/> Other (Specify) <input type="checkbox"/> Radio <input type="checkbox"/> Radar <input type="checkbox"/> Sonar <input type="checkbox"/> Wire <input type="checkbox"/> Tool <input type="checkbox"/> Test <input type="checkbox"/> Power <input type="checkbox"/> Sound <input type="checkbox"/> Other (Specify) <small>EQUIPMENT MODEL DESIGNATION</small> <small>TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED</small> <small>SERIAL NUMBER OF EQUIPMENT</small> <small>NAME OF CONTRACTOR</small> <small>CONTRACT NO.</small> <small>TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED</small> <small>SERIAL NUMBER OF UNIT</small> <small>CONTRACT OR PO DATA OF UNIT</small> <small>DATE EQUIPMENT RECEIVED</small> <small>ITEM WHICH FAILED</small> <small>THIS SIDE FOR TUBES</small> <small>TUBE TYPE INCLUDING PREFIX LETTERS</small> <small>SERIAL NO. (NOTE 4)</small> <small>TUBE MANUFACTURER</small> <small>CONTRACT NO. (NOTE 4)</small> <small>FACILITY OCCURRED IN</small> <input type="checkbox"/> Storage <input type="checkbox"/> Operation <input type="checkbox"/> Handling <input type="checkbox"/> Other (Specify in Remarks) <input type="checkbox"/> Installing <small>NATURE OF FAILURE AND REMARKS (NOTE 4) (CONTINUE ON BACK)</small> <small>THIS SIDE FOR PARTS (NOTE 9)</small> <small>NAME OF PART</small> <small>CIRCUIT SYMBOL (E&I 38)</small> <small>NAVAL TYPE NO.</small> <small>SERIAL NO.</small> <small>CONTRACT DATA</small> <small>DATE REC'D</small> <small>ARMY STOCK NO.</small> <small>CHICK OFF OR TAG DATA (NOTE 8)</small> <small>MANUFACTURER'S DATA (NOTE 8)</small> <small>BRIEF DESCRIPTION AND CAUSE OF FAILURE INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)</small> <small>CONCESSION</small> <input type="checkbox"/> Normal Replacement <input type="checkbox"/> Shortage <input type="checkbox"/> Malfunction <input type="checkbox"/> Failure <input type="checkbox"/> Transportation Breakage <input type="checkbox"/> Other (Specify) <small>*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES.</small> | |

SECTION 7

CORRECTIVE MAINTENANCE

1. FUSE LAMP.

a. The Tube Tester TV-3 U is protected by a combination FUSE lamp and overload indicator, E102, in the primary circuit of power transformer, T101. If the pilot light I102 does not glow when the tester is connected to a live ac line of proper voltage, remove FUSE lamp E101 from its socket, and check for continuity, using a low range ohmmeter. If FUSE is open replace from spares found in the lead compartment.

b. Line voltage of the power source may be checked by using the 200 volt ac range of the Model TV-3 U Multimeter section.

2. PILOT LAMP.

a. The type 47, 6.3 volt bayonet base pilot lamp E101 should glow when the TV-3 U is plugged into a live 115 volt ac outlet, and the power switch S106 is turned ON. If the lamp does not glow, but FUSE lamp E102 checks OK, unscrew the red jewel cover of the indicator I110 and check the lamp for continuity and looseness in the socket.

b. A burned out pilot lamp should be replaced with one from the operating spares found in the lead compartment.

3. NEON LAMP.

a. The neon lamp E103 used as a short indicator should be checked as follows:

(1) Be sure lamp is firmly screwed into its socket.

(2) With the tester plugged in and the power switch ON, but with no tube in test sockets, set the MASTER switch S112 to TUBE TEST.

(3) Set SELECTORS to JR-1111-1.

(4) Turn the SHORTS test switch S113 through positions 1, 2, 3, 4, and 5. The neon lamp should glow in positions 2 and 3.

b. If the neon lamp is defective replace it from the operating spares in the lead compartment.

Note

Do not deplete the supply of operating spares furnished with the equipment without taking the necessary steps to secure replacements.

4. TUBES.

a. Two full wave rectifier tubes are used in the TV-3 U. One type 83 V101 used in the mutual conductance test circuit to supply plate voltage and to supply dc voltage for the ohmmeter circuit of the Multimeter section. The 5Y3GT, V102 supplies dc screen and bias voltages for the tube under test.

b. Failure of the 83 tube V101 is indicated if, with no tube in the test sockets but the controls set for tube test, the pointer of the METER M101 moves sharply off scale to the right when the G_m push button P4 is pressed.

c. Failure of the type 5Y3GT tube would result in lack of voltage on the screen and plate circuits of the tube under test. To check plate and screen voltages refer to paragraph 7 of this section.

d. To remove rectifier tubes V101 and V102 for test, or replacement:

(1) Remove the ten mounting screws around the edge of the panel.

(2) Carefully lift the entire unit out of its case, and turn face down on the test bench or other flat surface.

(3) Slide the spring clamps holding the tubes in place, away from the top of the tube and to one side.

Note

After tubes are replaced in their sockets BE SURE THE TUBE CLAMPS ARE IN PLACE BEFORE THE EQUIPMENT IS RETURNED TO ITS CASE.

5. TEST LEADS.

a. Inspect all test leads for defective insulation and test for continuity. Make any minor repairs necessary, but if leads are in poor condition, or beyond repair, requisition replacements immediately.

6. SCHEMATIC WIRING DIAGRAM.

a. Refer to schematic diagram Figure 7-6 and internal views Figure 7-2, 7-3, 7-4, and 7-5 for correct wiring and placement of parts in the TV-3/U.

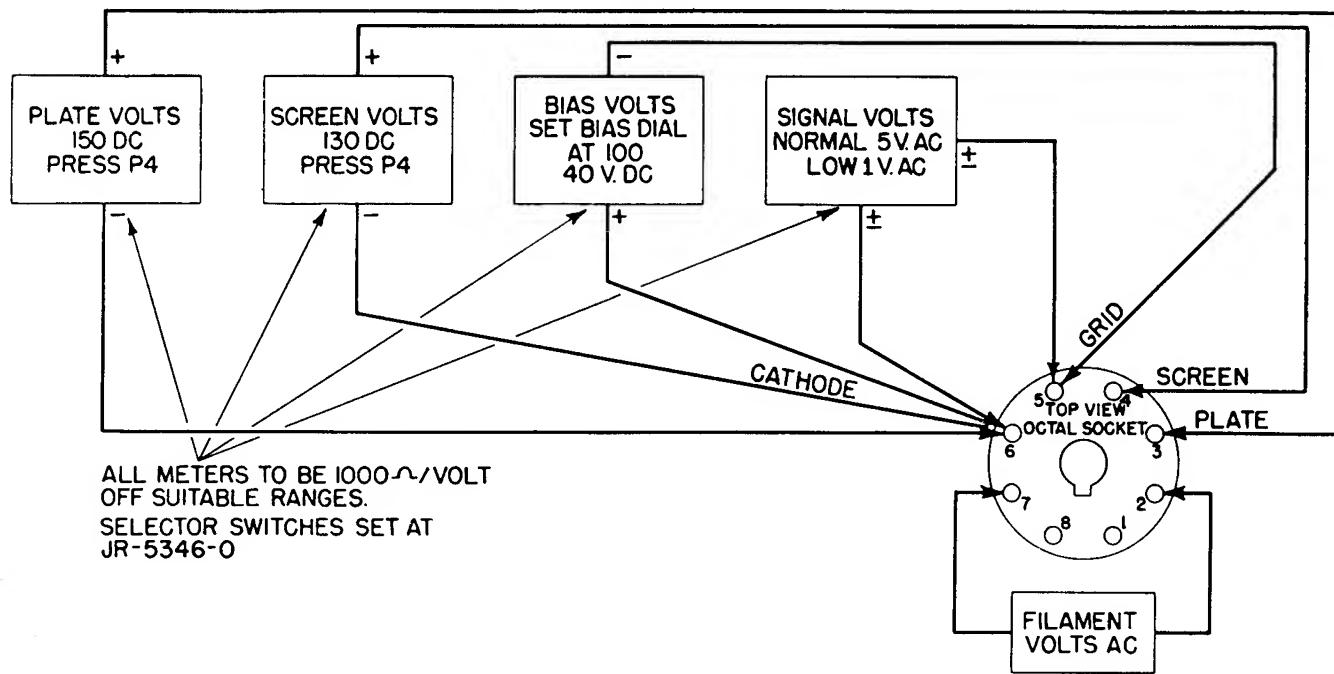


Fig. 7-1. Voltage Calibration Check Diagram

7. VOLTAGE AND CALIBRATION CHECK.

a. The Tube Tester section of the TV-3/U may be checked for proper voltages and for correct calibration of the SHUNT and BIAS control dials as outlined in the following steps:

(1) Set the MASTER switch, S112, and the SHORTS switch, S113, to TUBE TEST. Set the SELECTORS, S103, S104, S105, S108, S109, S110, and S115 to JR-5346-0. Turn power switch, S106, ON. Press LINE ADJ. push button P7 and turn LINE ADJUST control R113 until the METER pointer is set at LINE TEST.

Note

Voltage tests must be made with a multimeter, or individual meters of 1000 ohms per volt sensitivity having suitable ranges of ac and dc.

The Multimeter section of the TV-3/U cannot be used for these tests.

(2) PLATE VOLTAGE CHECK (150 vdc).

(a) Connect the positive (+) terminal of the voltmeter to contact No. 3 (RMA) of the octal test socket, X107, and the negative (-) terminal to contact No. 6 of the same socket. (See Figure 7-1)

(b) Press G_m push button P4. The voltmeter should read approximately 150 volts dc, \pm 2 volts.

(3) SCREEN VOLTAGE CHECK (130 vdc).

(a) Connect the positive (+) terminal of the voltmeter to contact No. 4 (RMA) of the octal test socket X107, and the negative (-) terminal to contact No. 6. (See Figure 7-1)

(b) Press G_m push button P4. The voltmeter should read approximately 130 volts dc, \pm 2 volts.

(4) BIAS VOLTAGE CHECK (40 vdc).

(a) Set the BIAS dial, I101 of bias control R116, at 100.

(b) Connect the positive (+) terminal of the voltmeter to contact No. 6 (RMA) of the octal test socket X107 and the negative (-) terminal to the No. 5 contact. (See Figure 7-1)

(c) The voltmeter should read approximately 40 volts dc, \pm 0.8 volts.

(5) SIGNAL VOLTAGE CHECK (1 and 5 vac).

(a) Set BIAS dial I101 of bias control R116 at zero.

(b) Connect the terminals of the ac voltmeter to contacts 5 and 6 (RMA) of the octal test socket X107. (See Figure 7-1)

(c) With the SIGNAL switch S107 set at NORMAL the meter should read approximately 5 volts ac, \pm 0.2 volts.

(d) With the SIGNAL switch S107 set at LOW the meter should read approximately 1 volt ac, \pm 0.04 volts.

(6) FILAMENT VOLTAGE CHECK (1.1 to 117 vac).

(a) Set FILAMENT voltage switch S101 to the desired voltage.

(b) Connect the terminals of an ac voltmeter or a multimeter of suitable range between contacts 2 and 7 (RMA) of octal test socket X107.

(c) The meter should read within the limits indicated in Table 7-1 for the various nominal setting of the FILAMENT voltage switch S101.

TABLE 7-1. FILAMENT VOLTAGE CHART FOR TUBE TESTER TV-3/U

| NOMINAL | MIN. | MAX. |
|---------|-------|-------|
| 1.1 | 1.1 | 1.2 |
| 1.5 | 1.5 | 1.7 |
| 2.0 | 2.0 | 2.2 |
| 2.5 | 2.7 | 2.9 |
| 3.0 | 3.3 | 3.5 |
| 4.3 | 4.4 | 4.7 |
| 5.0 | 5.4 | 5.6 |
| 6.3 | 6.4 | 6.7 |
| 7.5 | 7.6 | 8.0 |
| 10.0 | 10.1 | 11.0 |
| 12.6 | 12.5 | 13.2 |
| 20.0 | 19.0 | 21.0 |
| 25.0 | 26.0 | 28.0 |
| 35.0 | 34.0 | 39.0 |
| 50.0 | 50.0 | 56.0 |
| 75.0 | 73.0 | 83.0 |
| 117.0 | 118.0 | 128.0 |

(7) BIAS dial 1101 and SHUNT dial 1102 should indicate zero when they are in full counter clockwise positions.

b. If a tube shows defective in one TV-3/U tester and it checks good in other TV-3/U checkers, make a comparison check of voltages and resistances between socket connections with the selector switches and other controls set at the same settings on both the good and defective testers.

c. This comparison check will help to localize the trouble.

8. RESISTANCE CHECK FOR MULTIMETER SECTION.

a. TABLE 7-2 is intended as an aid in localizing trouble in the Multimeter section of the TV-3/U.

b. An ohmmeter or multimeter having suitable ranges should be connected to the VOLTS, MILS, OHMS, CAPACITY jacks J103 and J104.

CAUTION: Disconnect power cord before starting resistance measurements.

9. COPPER OXIDE RECTIFIER.

a. Failure of meter rectifiers of the type used in the Model TV-3/U seldom occurs in normal use.

b. A defective rectifier CR101 will cause a considerable drop in sensitivity on the ac ranges only. If the dc voltage circuits check out properly, but an appreciable error is found when measuring ac voltages, it is a definite indication that the rectifier CR101 is defective and should be replaced.

Caution

DURING FUNGUS PROOFING OPERATIONS BE SURE THAT NONE OF THE COATING COMPOUND IS USED ON OR PERMITTED TO COME IN CONTACT WITH THE COPPER OXIDE RECTIFIER. CHEMICALS USED IN THESE COATING COMPOUNDS MAY CAUSE DAMAGE TO METALLIC RECTIFIER ELEMENTS.

TABLE 7-2. POINT TO POINT RESISTANCE CHECK FOR MULTIMETER SECTION

| POSITION OF MASTER SWITCH | RESISTANCE ACROSS PIN JACKS J 103 AND J 104 | COMPONENT PARTS BY SYMBOL DESIGNATION WHICH SHOULD BE CHECKED FOR POSSIBLE FAILURE IF PROPER RESISTANCE READING ACROSS PIN JACKS IS NOT OBTAINED |
|---------------------------|---|--|
| OHMS X 1 | 1920 OHMS | R124, R125, R126, R127, R128, R130 |
| OHMS X 100 | 205,000 OHMS | R119, R120, R124, R126, R127, R128, R130 |
| VOLTS 20 | 20,000 OHMS | R131, R132, R133 |
| VOLTS 200 | 200,000 OHMS | R131, R132, R133, R137 |
| VOLTS 500 | 500,000 OHMS | R131, R132, R133, R137, R138 |
| VOLTS 1000 | 1 MEGOHM | R131, R132, R133, R137, R138, R139 NOTE: FOR A.C. VOLTAGE RANGES CR101 SHOULD ALSO BE CHECKED |
| CAPACITY 5 | 580 OHMS | R136 |
| CAPACITY 50 | 65 | R135 |
| MILS 20 | 38 | R125, R126, R127, R128 |
| MILS 200 | 3 | R125, R126, R127, R128 |

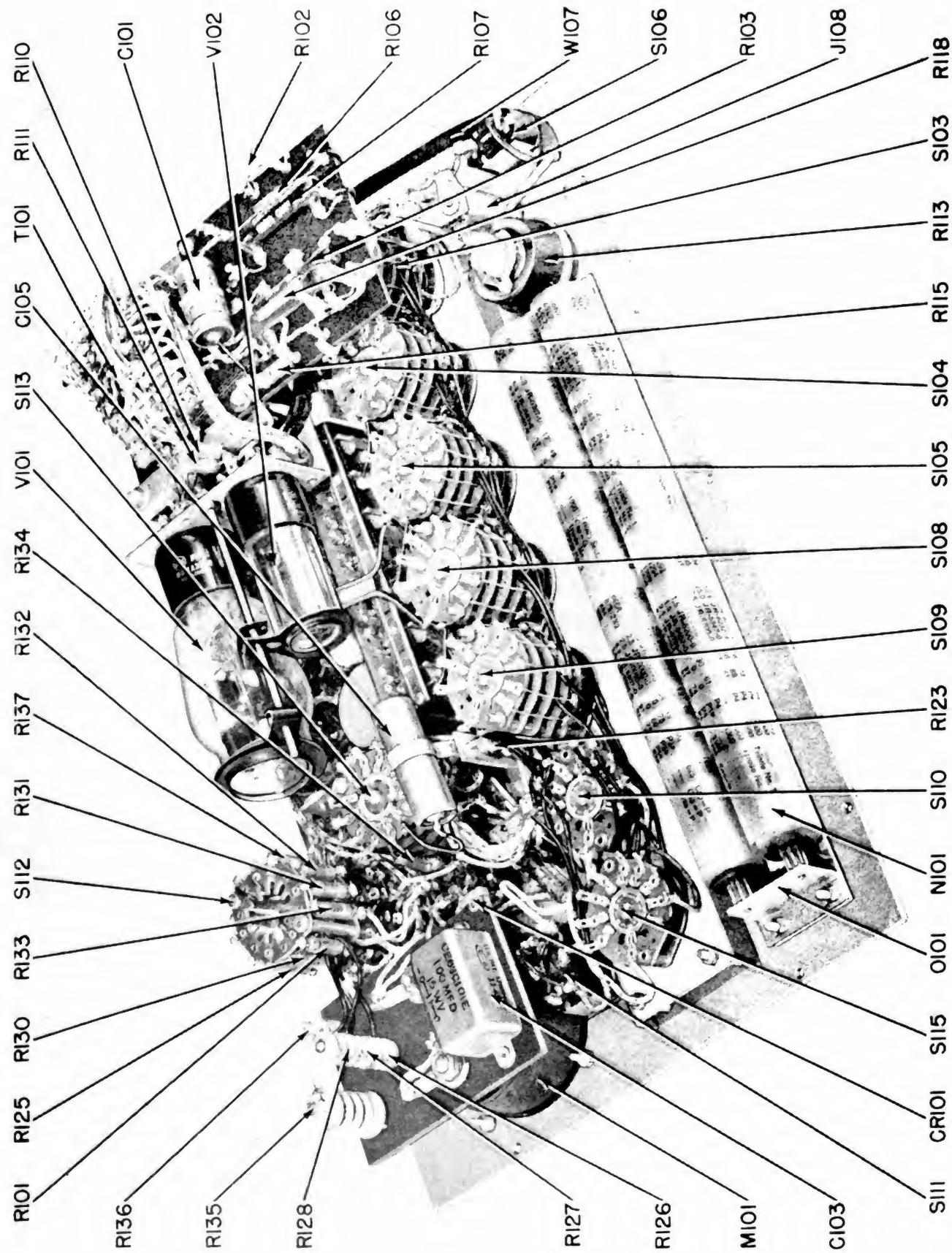


Figure 7-2. Internal View of Tube Tester TV-3/U (Front Left Oblique)

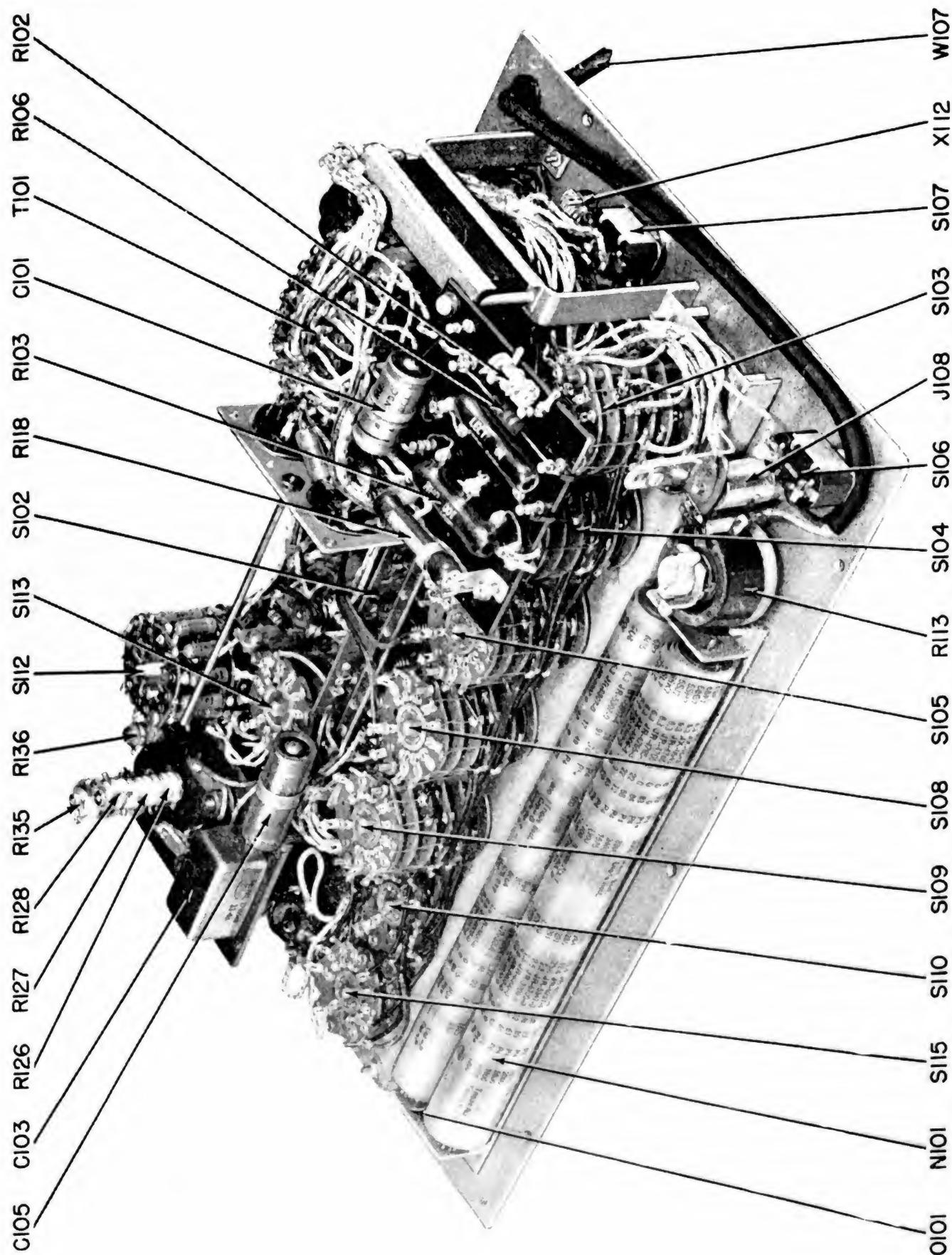


Figure 7-3. Internal View of Tube Tester TV-3/U (Front Right Oblique)

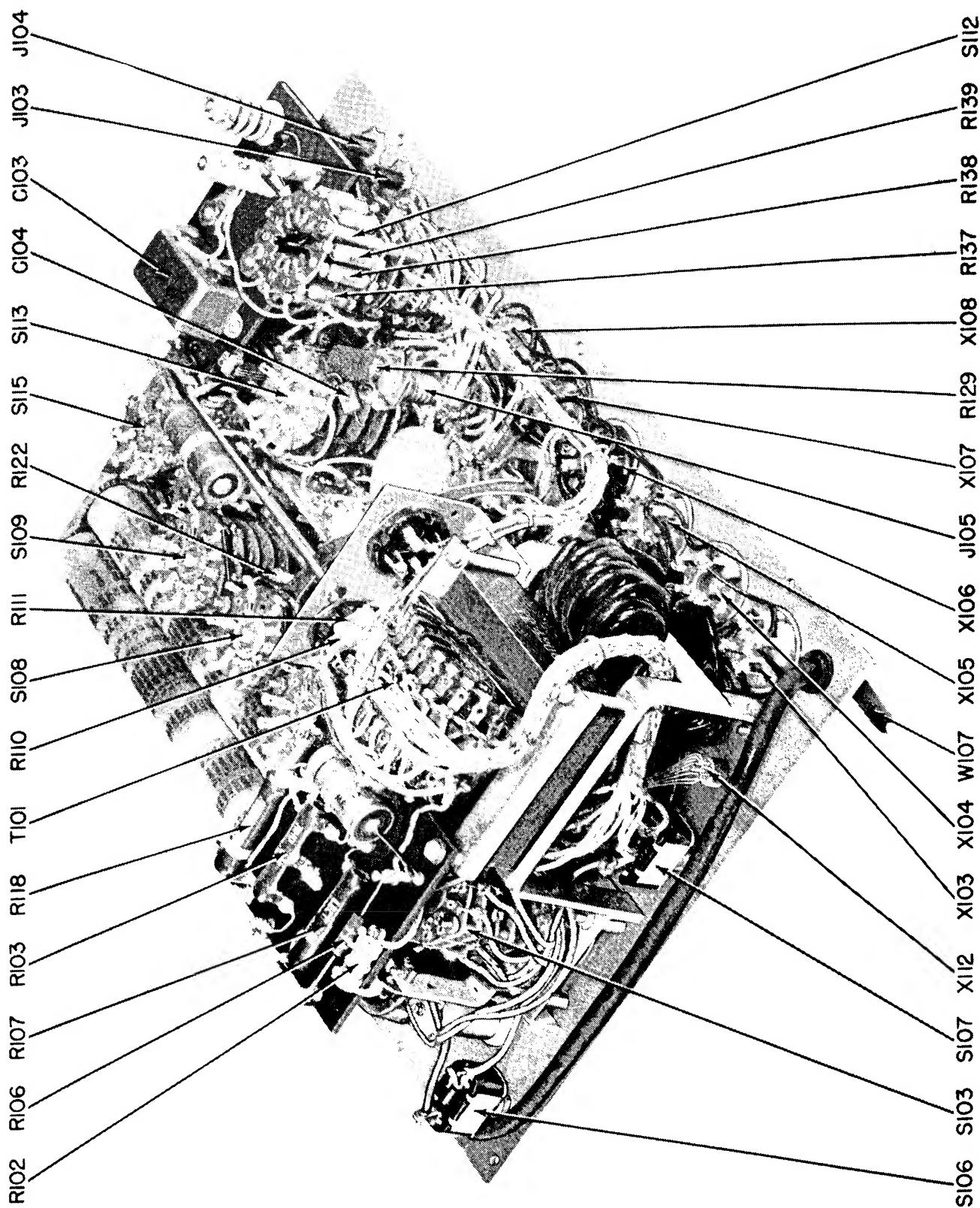


Figure 7-4. Internal View of Tube Tester TV-3/U (Rear Left Oblique)

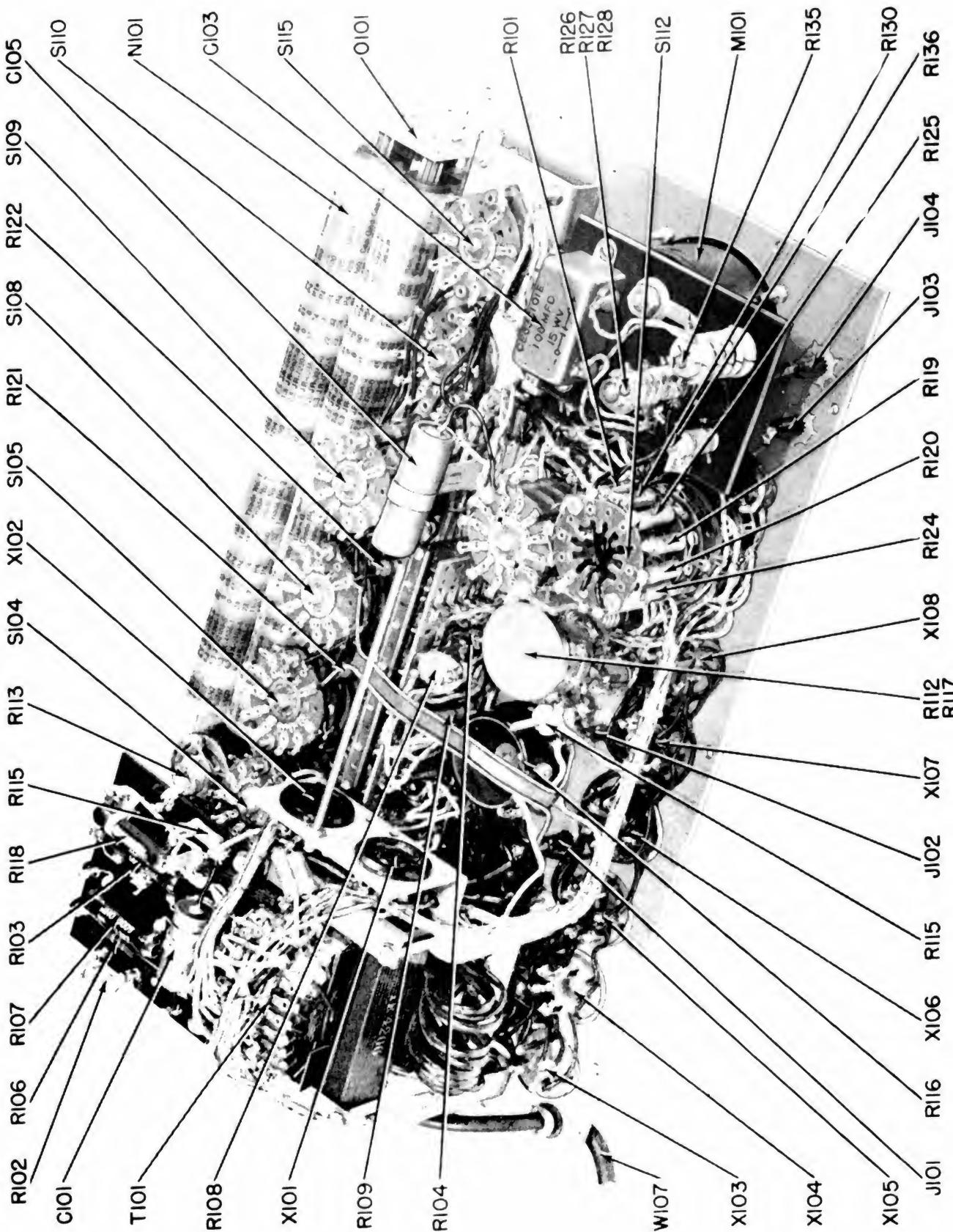


Figure 7-5. Internal View of Tube Tester TV-3/U (Rear Right Oblique)

7 Section

**NAVSHIPS 91254
TV-3/U**

NOTES

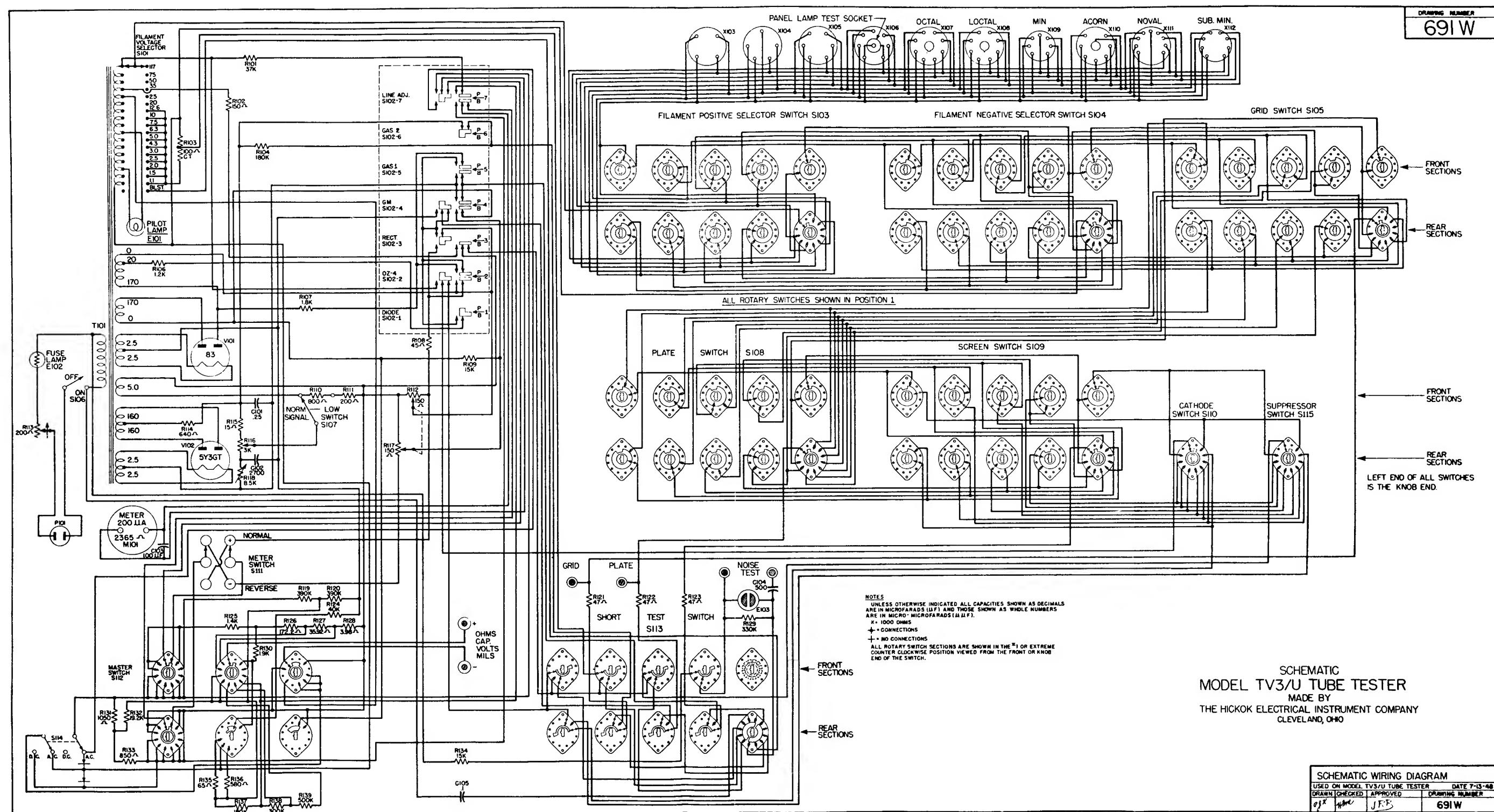


Figure 7-6. Schematic Diagram for Tube Tester TV-3/U

ORIGINAL

7-11 + 7-12

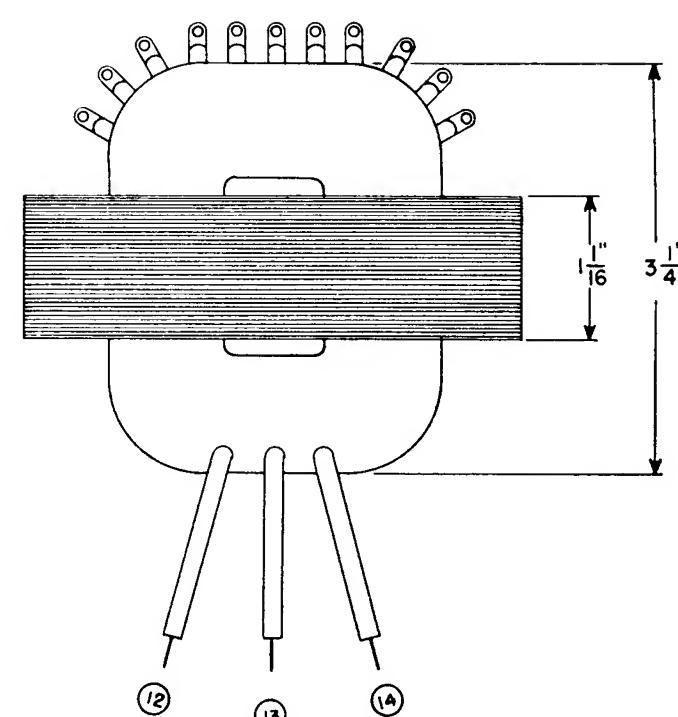
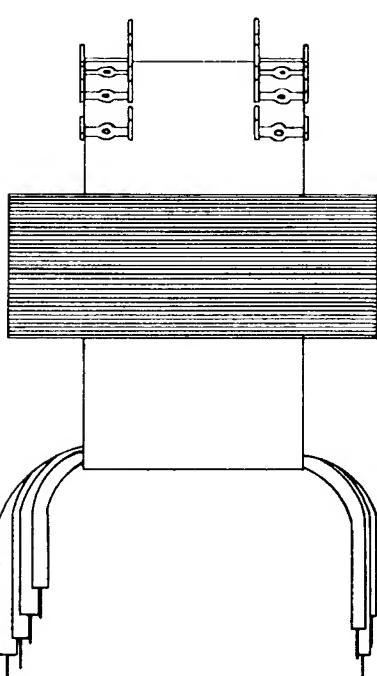
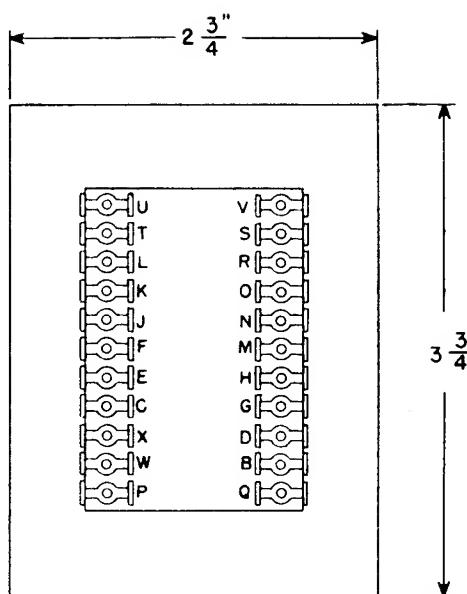
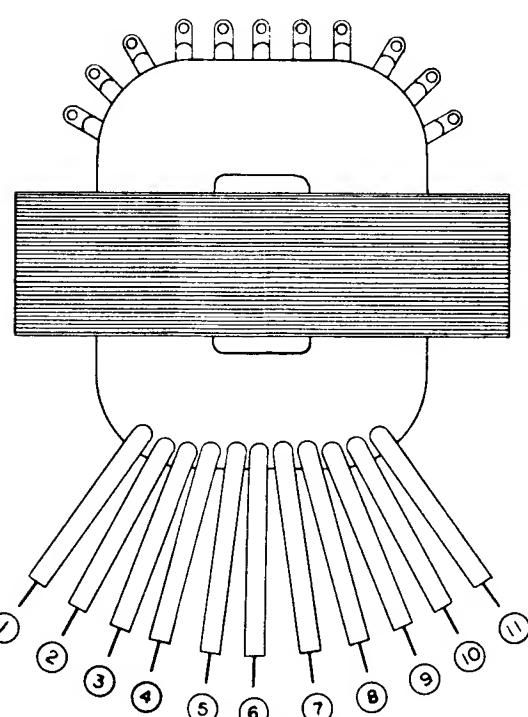
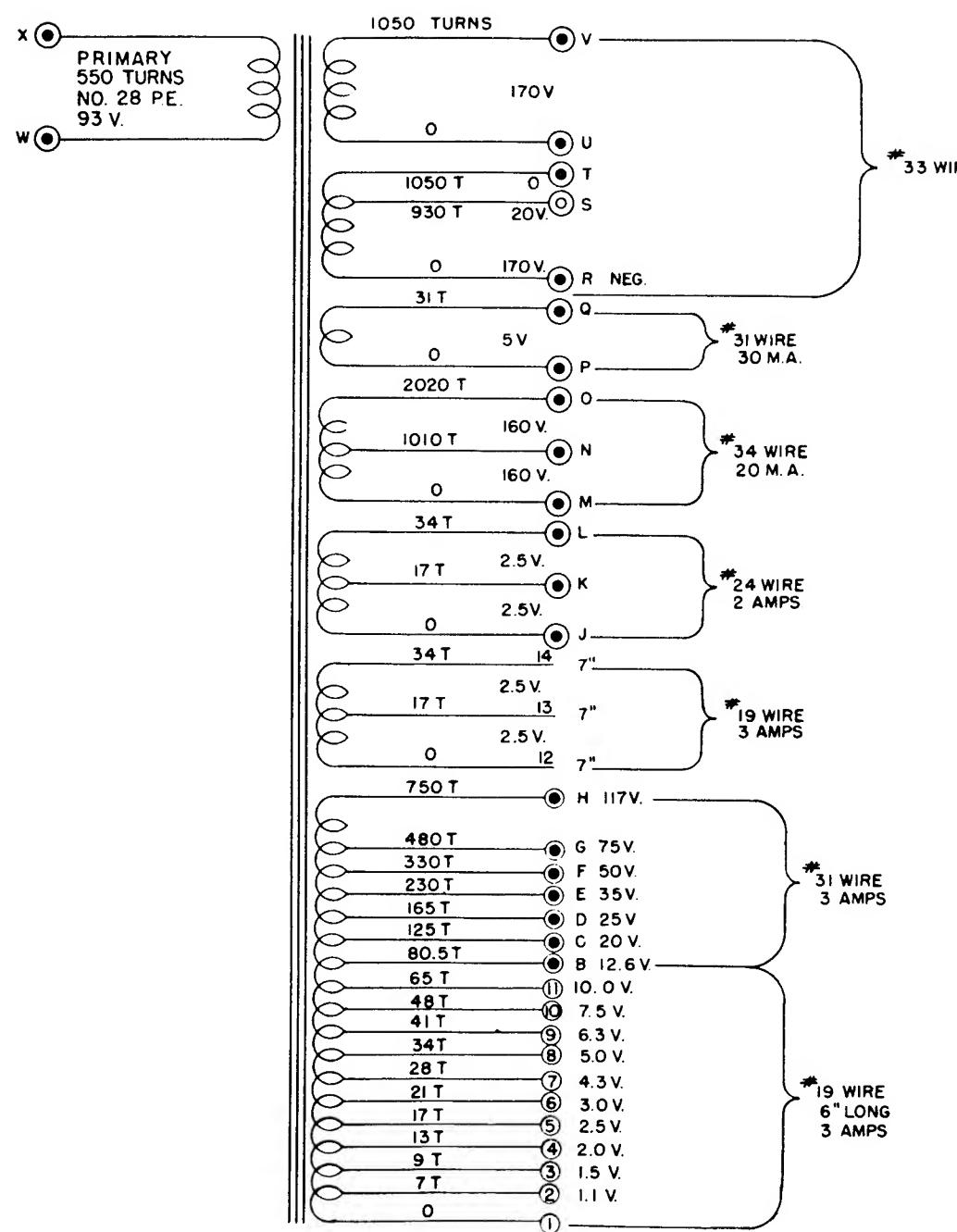


Figure 7-7. Transformer Diagram

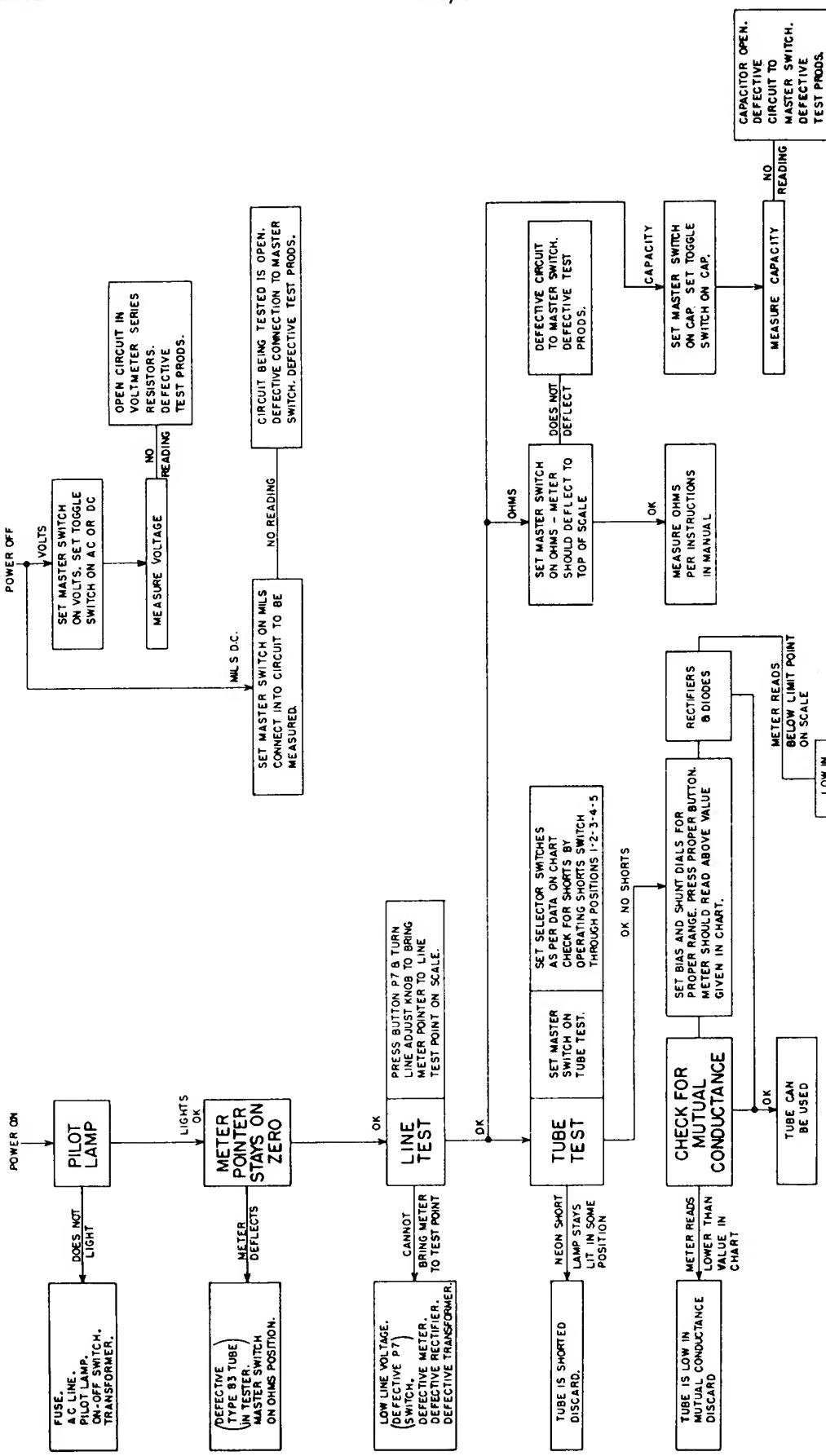


Figure 7-8. Trouble Shooting Chart

NOTES

TABLE 8-1. WEIGHT AND DIMENSIONS OF SPARE PARTS BOX

| EQUIPMENT SPARES | | | | | |
|------------------|--------------------|-------------------|--------------------|------------|----------------------|
| Spare Parts Box | Overall Dimensions | | | Volume | Weight |
| | Height | Width | Depth | | |
| 1 | 6 $\frac{1}{8}$ " | 9 $\frac{1}{4}$ " | 18 $\frac{1}{4}$ " | 1040 cu in | 26 $\frac{1}{4}$ lbs |

TABLE 8-2. SHIPPING WEIGHT DIMENSIONS OF SPARE PARTS BOX

| EQUIPMENT SPARES | | | | | |
|------------------|--------------------|-------|--------------------|------------|--------|
| Spare Parts Box | Overall Dimensions | | | Volume | Weight |
| | Height | Width | Depth | | |
| 1 | 9" | 22" | 11 $\frac{1}{2}$ " | 2280 cu in | 42 lbs |

TABLE 8-3. LIST OF MAJOR UNITS

| Symbol Group | Quantity | Name of Major Unit | Navy Type | Designation |
|--------------|----------|--------------------|-----------|-------------|
| | 1 | Tube Tester | TV-3/U | |

TABLE 8-4. COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL-DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | AWS JAN OR NAVY TYPE DESIG. | PARTS | | | MFR AND MFR'S DESIG. | CONTRACTOR'S DWG. AND PART NO. | ALL SYMBOL DESIGNS INVOLVED | TOTAL Q'TY PER EQUIP. |
|---------------|--|--------------------------------|-----------------------------|------------------|----------------|--------------------------|----------------------|--------------------------------|-----------------------------|-----------------------|
| | | | | NAVY STOCK NO. | ARMY STOCK NO. | 3DA250-479 | | | | |
| C-101 | CAPACITOR, fixed; paper; single section; 250,000 mmf p/m 10%; 400 VDCW; herm sealed metal case, 1 1/8" lg. x 1 1/16" diam; mineral oil impreg; two axial wire leads; no internal ground; radial mtg. brack et. | Filter Capacitor Bias Network | N16-C-46343-7706 | | | 3105-120 | Sollar X11LWW | C-101 | 1 | |
| C-102 | CAPACITOR, fixed; mica; JAN type CM30B272K; 2700 mmf p/m 10%; Spec #JAN-C-5 | Neutralizing Capacitor | CM30B272K | N16-C-32145-5164 | 3K3027221 | X3095-41 | Cornell Dubilier | C-102 | 1 | |
| C-103 | CAPACITOR, fixed; electrolytic; JAN type CE63C101E; 100 mfd. = 10% ; +250, 15 VDCW; Spec JAN-C-62 | Filter Capacitor across Meter | CE63C101E | N16-C-20179-5441 | 3DB100-45 | 3085-35 | Cornell Dubilier | C-103 | 1 | |
| C-104 | CAPACITOR, fixed; mica; JAN type CM20B471K; 470 mmf p/m 10%; Spec #JAN-C-5 | Isolating Capacitor Noise Test | CM20B471K | N16-C-30114-4276 | 3K2047121 | X3095-S | Cornell Dubilier | C-104 | 1 | |
| C-105 | CAPACITOR, fixed; paper; JAN type CP26A1EF104K; 100,000 mmf p/m 10%; 600 VDCW; Spec #JAN-C-25 | Isolating Capacitor Short Test | CP26A1EF-104K | N16-C-45777-4137 | 3DA100-730 | Hickok Part #3105-114 | 3105-114 | C-105 | 1 | |
| CR-101 | RECTIFIER, metallic; copper oxide; input 4.5 V.A.C.; output 3 V.D.C. @ .5 ma; 7/16" lg x 3 3/8" wd x 1 1/4" h o/a excluding term; 3 3/8" mtg. holes, on 5 1/2" mtg/c; 4 wire leads 4" lg; P/o Navy Tube Tester Model TV-3/U; | Meter Rectifier | | N17-R-50882-2388 | 3H4838-15.3 | Bradley Type #CX2E2D | Part 'Dwg #18150-14 | CR-101 | 1 | |
| E-101 | LAMP, incandescent; 6 to 8 volts @ .15 amps; bulb T 3 1/4 clear; 1 1/8" lg overall; miniature bayonet base; C-2 filament; burn any position; | Pilot Lamp | | N17-L-6297 | 2Z5052 | Sylvania Prod type #S-47 | 12270-12 | E-101 | 1 | |
| E-102 | LAMP, incandescent; 6 to 8 V 6 cp; type G6 clear; 1 1/8" miniatire bayonet base; C-2R filament; burn any position. | Fuse | | N17-L-6686 | 626806.14 | Tungsol #81 | X-1227O-2 | E-102 | 1 | |

| | | | | | | | | |
|-------|--|--|--|------------------|------------|-----------------------|-----------|-------|
| E-103 | LAMP, glow; 11.5 V $\frac{14}{15}$ W; striking voltage AC55 DC70; T 4 $\frac{1}{2}$ clear; 1 $\frac{1}{2}$ " overall length; Candelabra screw base; PW 27 Electrode; burn any position; Neon gas. | CLIP ASSEMBLY, tube contact: grid and plate connector for lighthouse tubes; used with Tube Tester TV-3. 1; one 1 $\frac{1}{2}$ " diam plate clip and one silver plated phosphor bronze grid clip mounted in and insulated from a cylindrical metal shell; blued steel shell, phenolic insulation; cylindricats shape; 1 $\frac{1}{8}$ " diam x 1 $\frac{1}{2}$ " lg excluding contact clips; friction fit into over plate and grid connections of tube; replacement part, supplied less leads. | Replacement Test cap; part of W-101 | N17-L-6793 | 2Z5889-16 | G.E. Catalogue #NE 17 | X-12270-1 | E-103 |
| E-104 | | | Ucinite #J-1348-1-2 | | | #3075-13 | E-104 | 1 |
| E-105 | INSULATOR, clip: conical shape; black polyvinyl acetate; 1 $\frac{5}{8}$ " lg; $\frac{9}{16}$ " ID x 1 $\frac{1}{2}$ " ID max. | Replacement Test clip insulator; part of W-103 | Mueller #87 Black | | | #9720-12 | E-105 | 1 |
| E-106 | INSULATOR, clip: conical shape; red polyvinyl acetate; 1 $\frac{5}{8}$ " lg; $\frac{9}{16}$ " ID x 1 $\frac{1}{2}$ " ID max. | Replacement Test Clip Insulator; part of W-102 | Mueller #87 Red | | | #9720-11 | E-106 | 1 |
| E-107 | PROD, test: nickel plated tip with black plastic handle; wire secured in tip by knurled sleeve nut; will accommodate #18 AWG wire; handle 1 $\frac{1}{16}$ " ID; 5 $\frac{1}{16}$ " lg x 3 $\frac{1}{8}$ " diam approx over-all. | Replacement Prod; part of W-105 | American Radio Hd'ware part #145 Black | | | #16975-13 | E-107 | 1 |
| E-108 | PROD, test: nickel plated brass tip with red plastic insulating handle; wire secured in tip by knurled sleeve nut; will accommodate #18 AWG wire; handle 1 $\frac{1}{16}$ " ID; 5 $\frac{1}{16}$ " lg x 3 $\frac{1}{8}$ " diam approx over-all. | Replacement Prod; part of W-104 | American Radio Hd'ware part #145 Red | | | #16975-1 | E-108 | 1 |
| H-101 | PLATE, indicator: Cellulose acetate clear; 11 $\frac{1}{2}$ " lg x 1 $\frac{1}{2}$ " wd x .020 thk; four 3 $\frac{3}{16}$ " diam mtg holes on 11 $\frac{1}{4}$ " x 1 $\frac{1}{4}$ " mtg g c; single red indicator line 1 $\frac{1}{32}$ " wd printed lengthwise on center line; 5 $\frac{1}{16}$ " x 1 $\frac{1}{4}$ " cut out at one end to clear roller index knob. | Protection and Guide Line for Roll Chart | Hickok Part #23800-19 | N16-P-403561-112 | 2Z7091-225 | Part/Dwg. #23800-19 | H-101 | 1 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | CONTRACTOR'S DWG. AND PART NO. | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL QTY PER EO QTY |
|------------------|--|---|---|----------------------|------------------------|--------------------------------------|--|----------------------------------|
| | | | AWS JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | | | |
| I-101 | DIAL: bias control; etched aluminum dial filled in black attached to black phenolic bar knob; approx. diamen. $1\frac{5}{16}$ " diam x $\frac{7}{8}$ " high o/a; mounts on $\frac{1}{4}$ " diam shaft by means of one #8-32 set screw; filled black numerals 0,10,20, through 100, 100 scale divisions on 300° arc, non uniform spacing. | Adjustment of Bias Voltage Applied to Tube under Test | N16-D-46346-6726 | 2Z3718.142 | Hickok Part #4160-57 | Part #4160-37 Dwg. #4160-12 | I-101 | 1 |
| I-102 | DIAL: SHUNT control; etched aluminum dial filled in black attached to black phenolic bar knob; approx. diamen. $1\frac{5}{16}$ " diam x $\frac{7}{8}$ " high o/a; mounts on $\frac{1}{4}$ " diam shaft by means of one #8-32 set screw; filled black numerals 0,1,0,20 etc. through 100, 100 scale divisions; | Adjustment of Shunt and Micromho Range Selector | N16-D-46346-6686 | 2Z3718.138 | Hickok Part #4160-60 | Part #4160-60 Dwg. #4160-12 | I-102 | 1 |
| I-103 | DIAL: brass, temper $\frac{1}{2}$ H with etched letters enamelled black, satin chrome background; alphabetical range: BCDEFGHIJK; $1\frac{5}{16}$ " diam, center hole .233" dia with $.190$ " flat; mounts on $1\frac{1}{4}$ " dia flattened shaft behind panel. | For Indication of Proper Setting of Selector Switches | N16-S-117101-262 | 2Z3718.137 | Hickok Part #X4150-65 | Part # X-4150-65 Dwg. #4150-16 | I-103 | 1 |
| I-104 | DIAL: brass, temper $\frac{1}{2}$ H with etched letters enamelled black, satin chrome background; alphabetical range: KSTUVWXYZ; $1\frac{5}{16}$ " diam, center hole .253" dia with $.190$ " flat side; mounts on $1\frac{1}{4}$ " dia flattened shaft behind panel. | Same as I-103 | N16-S-117101-260 | 2Z3718.136 | Hickok Part #X-4150-66 | Part # X-4150-66 Dwg. #4150-16 | I-104 | 1 |
| I-105 | DIAL: brass, temper $\frac{1}{2}$ H with etched numbers enamelled black, satin chrome background; numerical range 0 to 9 inclusive; $1\frac{5}{16}$ " diam, center hole .253" dia with $.190$ " flat; mounts on $1\frac{1}{4}$ " dia flattened shaft behind panel. | Same as I-103 | N16-S-117101-261 | 2Z3718.135 | Hickok Part #X-4150-64 | Part # X-4150-64 Dwg. #4150-16 | I-105 | 1 |

| | | | | |
|-------|---|-------------------------------------|-----------------------|--------------------|
| I-106 | DIAL; Same as C-105 | Same as I-103 | | |
| I-107 | DIAL; Same as C-105 | Same as I-103 | | |
| I-108 | DIAL; Same as C-105 | Same as I-103 | | |
| I-109 | DIAL; Same as C-105 | Same as I-103 | | |
| I-110 | LIGHIT, indicator; with lens; $\frac{1}{2}''$ clear red jewel lens; for miniature bayonet base T-3 $\frac{1}{4}$ lamp; open frame; brass nickel plate; $1\frac{1}{16}'' \times \frac{7}{8}'' \times 1\frac{1}{16}''$ H o/a, behind mtg, sur jewel extends approx $\frac{1}{2}''$, in front of mtg sur; mounts in $1\frac{1}{16}''$ mtg hole; $\frac{1}{4}''$ max panel thickness; lamp mounted horiz, removable from front; threaded jewel; two solder lug terminals. | Used with E-101 | N17-L-76850- 3998 | 2Z5991-3 I-110 |
| J-101 | CONNECTOR, receptacle; single contact, phosphor bronze; straight; $\frac{1}{2}''$ diam x $\frac{3}{4}''$ lg o/a excluding term; cyl- indrical black phenolic body; opening for $.080''$ to $\frac{3}{32}''$ diam pin plug mounts in $1\frac{1}{32}''$ diam panel hole; supplied with speed nut for mtg. | For insertion of Grid Cap Lead | N17-C-73108- 1999 | 2Z5581-5 J-101 |
| J-102 | CONNECTOR, receptacle; single contact, phosphor bronze; straight; $\frac{1}{2}''$ diam x $\frac{3}{4}''$ lg o/a excluding term; cyl- indrical red phenolic body; opening for $.080''$ to $\frac{3}{32}''$ diam pin plug; mounts in $1\frac{1}{32}''$ diam panel hole; supplied with speed nut for mtg. | For Insertion of Plate Cap Lead | N17-C-73108- 2000 | 2Z5581-4 J-102 |
| J-103 | CONNECTOR, receptacle: Same as J-101 | For Insertion of Black Test Lead | N17-L-50844- 4672 | 2Z5056.16 J-103 |
| J-104 | CONNECTOR, receptacle: Same as J-102 | For Insertion of Red Test Lead | N17-L-50844- 4672 | X-11350.2 J-104 |
| J-105 | LAMPHOLDER; candalabra screw; brass shell body; 115 V, 10 W; $\frac{1}{2}''$ diam x $\frac{1}{2}''$ lg excluding terminals and mtg bracket; one elongated mtg hole $\frac{1}{16}''$ x $\frac{7}{8}''$ in bracket; mtg bracket extends $1\frac{1}{4}''$ behind base of socket, two solder lug term on opposite sides. | Used with E-103 | X-114-14L-LT J-105 | |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL PER EQUIP. NO. |
|------------------|--|---|--|----------------------|---|--------------------------------------|--|-------------------------------|
| | | | AWS, JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | MFR AND MFR'S DESIG. | | |
| J-106 | CONNECTOR, female contact; Same as J-101 | For Insertion of Noise Test Lead | | | | | | |
| J-107 | CONNECTOR, female contact; Same as J-101 | Same as J-105 | | | | | | |
| J-108 | LAMPHOLDER; candelabra bayonet; steel shell body; 115 V, 10 W; $\frac{5}{8}$ " diam x $1\frac{3}{16}$ " lg excluding terminals and mtg bracket; one elongated mtg hole $3\frac{3}{16}$ " x $7\frac{1}{8}$ " in bracket; mtg bracket extends $1\frac{1}{4}$ " behind base of socket; two solder lug term on opposite sides. | Used with E-102 | N17-L-51678-3452 | 6Z8332 | Drake type #614L-CH-LTR | X-19350-1 | J-108 | 1 |
| M-101 | METER, multi-scale: DC; scale ranges 0 - 3000 / 15000 micromhos, 0 - 1 Meg / 100 Meg, ohms 0 - 200 / 500 / 1000 volts and mils, 0 - 5 / 50 microfarads; square phenolic, flush mtg case; barrel diam $2\frac{3}{4}$ ", depth behind flange $1\frac{13}{32}$ ", rectangular flange $3\frac{1}{8}$ " x $3\frac{1}{2}$ " x $1\frac{13}{32}$ ", excluding terminals; accuracy $2\frac{1}{2}\%$; D'Arsonval movement; 200 Microamps basic movement sensitivity, resistance 2365 ohms p/m 50 ohms; calibrated for non-magnetic panel; micromho scale 60 divisions, black on white; ohms scale 130 divisions, black on pastel orange; volts and mils scale 50 divisions, black on pastel red; microfarad (MF) scale 40 divisions, black on pastel green; meter designed only for use in Navy Model TV-3/U Tube Tester which contains all associated circuit components; four $4-36$ mtg studs $1\frac{1}{16}$ " lg on $2\frac{1}{4}$ " mtg/c; two stud terminals $1\frac{1}{2}$ " - 28 th'd $1\frac{1}{16}$ " lg spaced $1\frac{1}{2}$ " c to c; check points for diodes, rectifier and line test; Hickok Model S46. | For Indications of Line Test Micromhos Volts Ohms Mils Capacity | N17-M-29380-5596 | 3F32(9)-9.2 | Hickok Part #460-641 Dwg. #A-478 S-46 | Part #460-641 Dwg. #A-478 S-46 | M-101 | 1 |

| | | | | | |
|-------|---|---|-------------|--------------------------------------|-------|
| N-101 | CHART, roll; Tube test data; and Instructions Translucent plastic .003" thick x 10.25" wide x approx 90" long; Black print on translucent white background; P o Navy Tube Tester Model TV-3 U. | N16-S-2900001-102 | (61)10124-2 | Hickok Part #X3200-32 | N-101 |
| O-101 | DRIVE, chart; p o Navy Tube Tester Model TV-3 U. Dual fiber rollers, $\frac{3}{4}$ " diam mounted and geared on end plated welded panel assembly; Rectangular; $1\frac{1}{2}$ " wide x $11\frac{5}{8}$ " long x $1\frac{1}{2}$ " deep; 4 mounting holes $\frac{3}{16}$ " dia on $1\frac{1}{2}$ " x $11\frac{1}{4}$ " mig c. | N16-D-900201-101 | 2Z3876.108 | Hickok Part #X-9600-7 | O-101 |
| O-102 | CLIP; electron tube contact; connector for grid or plate caps $\frac{1}{4}$ " to $\frac{3}{8}$ " diam; spring brass, end plated; $1\frac{1}{4}$ " lg x $11\frac{1}{16}$ " wd x $7\frac{7}{16}$ " h overall; black phenolic insulation; one solder connection. | Replacement Tube Cap; part of W-106 | | Amphenol #3075-12 | O-102 |
| O-103 | CLIP; test; steel end plate; $1\frac{1}{2}$ " lg x $5\frac{5}{16}$ " wd x $1\frac{1}{2}$ " h overall; one pierced hole for solder connection; (see note) $\frac{3}{8}$ " maximum jaw opening; supplied less terminal screw; solder connection required; (see note) | Replacement Test Clip; part of W-102 and W-103 | | Mueller #45 Pee Wee #3300-3 | O-103 |
| P-101 | CONNECTOR, plug; one r'nd male contact, nickel plated brass; $\frac{5}{32}$ " diam x $7\frac{7}{16}$ " lg; straight; red phenolic head $25\frac{1}{16}$ " diam x $3\frac{1}{8}$ " lg; overall diamen $25\frac{1}{16}$ " diam x $13\frac{1}{16}$ " lg; will accommodate #8 AWG wire; solder connection to wire. | Replacement Plug; part of W-101, W-102, W-103, W-105, and W-106 | | Amphenol Part #71-1S Red #16526-29 | P-101 |
| P-102 | CONNECTOR, plug; one r'nd male contact, nickel plated brass; $\frac{5}{32}$ " diam x $7\frac{7}{16}$ " lg; straight; black phenolic head $25\frac{1}{16}$ " diam x $3\frac{1}{8}$ " lg; overall diamen $25\frac{1}{16}$ " diam x $13\frac{1}{16}$ " lg; will accommodate #8 AWG wire; solder connection to wire. | Replacement Plug; part of W-101 and W-104 | | Amphenol Part #71-1S Black #16525-40 | P-102 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL Q'ty PER EQ. Eq. |
|------------------|---|---|---|----------------------|----------------------|--|------------------------------------|
| | | | AWS JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | | |
| P-103 | CONNECTOR, plug; 5 round male contacts, nickel plated brass, .125" diam x $\frac{9}{16}$ " lg, to fit standard 5 pin tube socket; straight; overall dimensions $1\frac{3}{8}$ " diam x $3\frac{3}{8}$ " lg excluding contacts; round phenolic body. | Replacement Socket Connection: part of W-102 | | | | Amphenol part #71-5 | P-103 |
| P-104 | CONNECTOR, plug; two flat parallel blades; straight; $1\frac{3}{8}$ " diam x $1\frac{15}{16}$ " lg overall excluding terminals; 15 amps 125 volts 10 amps 250 volts; round rubber body; molded rubber insert; cable opening .260" to .312". | Replacement Plug for W-107 | | | | Bryant type HRB | P-104 |
| | Note: P-104 is listed as a replacement part only and is not used on original equipment. | | | | | | |
| R-101 | RESISTOR, fixed; Composition; 37,000 ohms p/n 1C-1 $\frac{1}{2}$ watt; F characteristic; $\frac{5}{8}$ " long x $17/64$ " diam; insulated moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Dropping Resistor Line Test Circuit | N16-R-73135-69001 | 3Z6637 | | Wilker Prod. Carbonfil #CP 1 $\frac{1}{2}$ | R-101 |
| R-102 | RESISTOR, fixed; wire w/d; body diam $\frac{3}{4}$ " lg x $3\frac{1}{8}$ " diam excluding term; resistant to humidity; two radial wire stub terminals; ceramic body; p/o Navy Model "TV-3/C" Tube Tester. | Load Resistor Rectifier Test | N16-R-S1194-9849 | 3Z6015-102 | | Hickok Part #18073-218 (1.50) | R-102 |
| R-103 | RESISTOR, fixed; wire w/d; JAN type RW31F101T; 100 ohms p/n 5C-1C/1; 10 watts; Spec #JAN-R-20A | Provides Center Top for Filament in Filament Type Tubes | RW31F101T | N16-R-67303-2596 | 3RW18326 | Hickok Part #X-18575-19 | R-103 |
| R-104 | RESISTOR, fixed; Composition; JAN type RC20BF184K; 180,000 ohms p/n 10C-1 $\frac{1}{2}$ watt; Spec. # JAN-R-11 | Series Resistor Gas Test Circuit | RC20BF184K | N16-R-50396-811 | 3RC20BF184K | Hickok Part #X-18414-182 | R-104 |

| | | | | | | | | | | |
|-------|---|------------|----------------------|---|--|----------------------|---|---------------|------------------------------------|-------|
| R-106 | RESISTOR, fixed; Composition: JAN type RC30BF122K; 1200 ohms p/m 10' 7/8; 1 watt; Spec #JAN-R-11 | RC30BF122K | N16-R-49941- 231 | K | Limiting Resistor Diode Test Circuit | N16-R-49941- 231 | K | 3RC30BF122- | Hickok Part #X-18422-122 | R-106 |
| R-107 | RESISTOR, fixed; wire wnd; JAN type RW31F182; 1800 ohms p/m 5' 7/8; 10 watts; Spec #JAN-R-26A | RW31F182 | N16-R-66094- 5706 | | Limiting Resistor 0Z4 Test Circuit | N16-R-66094- 5706 | | 3RW25819 | Hickok Part #X-18575-12 | R-107 |
| R-108 | RESISTOR, fixed; wire wnd; 45 ohms p/m 1' 7/8; 1/2 watt; body diameter $\frac{15}{32}$ " lg x $1\frac{1}{2}$ " diam excluding term; resistant to humidity; two radial wire stub terminals $\frac{1}{8}$ " lg; ceramic body; p/o Navy Model TV-3 U-Tube Tester | | N16-R-81081- 8369 | | Meter Shunt Rectifier Test Circuit | N16-R-81081- 8369 | | 3ZG004E5-12 | Hickok Part #18673-312 (45) | R-108 |
| R-109 | RESISTOR, fixed; Composition JAN type RC30BF153J; 15000 ohms p/m 5' 7/8; 1 watt; Spec #JAN-R-11 | RC30BF153J | N16-R-50335- 751 | | Limiting Resistor Tube Test Plate Circuit | N16-R-50335- 751 | | 3IRC30BF1.53J | Hickok Part #X-18423-151 | R-109 |
| R-110 | RESISTOR, fixed; Composition: 800 ohms p/m 1' 7/8; 1/2 watt; "F" characteristic; $\frac{5}{8}$ " lg x $1\frac{1}{4}$ " diam, insulated; moisture resistant; two axial wire leads; polyvinyl chloride insulating sleeve. | | | | Part of Voltage Divider Signal Volt- | N16-R-72978- 7158 | | 3ZG680-66 | Wilkor Prod Type CP1 ₂ | R-110 |
| R-111 | RESISTOR, fixed; Composition; 200 ohms p/m 1' 7/8; 1/2 watt; "P" characteristic; $\frac{5}{8}$ " lg x $1\frac{1}{4}$ " diam, insulated; moisture resistant; two axial wire leads; polyvinyl chloride insulating sleeve. | | | | Same as R-110 | N16-R-72919- 2958 | | 3ZG620-260 | Wilkor Prod. Type CP1 ₂ | R-111 |
| R-112 | RESISTOR, variable; wire wound; dual section 150 ohms each section; p/m 5' 7/8; 4 watts max; 3 soldier lug term; each section; metal case $1\frac{3}{4}$ " diam x $1\frac{1}{16}$ " deep including both sections; enclosed; round metal shaft $1\frac{1}{4}$ " diam x $\frac{5}{8}$ " lg from mounting surface; linear; contact arms insulated from case; normal torque; $3\frac{1}{8} \times 32$ nut bushing $\frac{1}{4}$ " lg from mug surface; both sections must be within $5\frac{1}{2}$ ' of 150 ohms but each section must also be within 1% of the total resistance of the other section; adjusted at contractors factory; p/o Navy Tube Tester model TV-3/U | | N16-R-92231- 4291 | | Shunt Potentiometer Control of Meter Sensitivity | N16-R-92231- 4291 | | 3ZT7150-4 | Hickok Part #16926-1 Dwg #16925-4 | R-112 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | ALL SYMBOL DESIGNA- TIONS INVOLVED | PER E&Z DWG. |
|------------------|--|--|---|----------------------|----------------------|--|------------------------------------|
| | | | AWS JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | | |
| R-113 | RESISTOR, variable: wire wound JAN type RP101FD-201KK; 200 ohms p/m 10%; Spec JAN-R-22 | Line Adjust Rheostat | RP101FD-201-KK | N16-R-90301-2675 | 3R1P6007 | Hickok Part #X-18730-13 | R-113 |
| R-114 | RESISTOR, fixed: Composition; 15 ohms p/m 1% ; 1 watt; "P" characteristic; $\frac{1}{2}$ " diam x $\frac{9}{32}$ " diam; non-insulated; resistant to humidity; two radial wire leads. | Part of Voltage Divider Bits and Screen Volts | | N16-R-73454-3176 | 3Z6001E18-3 | Continental Carbon Type X-1 | Part #18550-39 Dwg A-623 R-114 |
| R-115 | RESISTOR, fixed: Composition; 640 ohms p/m 1% ; 1 watt; "P" characteristic; $\frac{7}{8}$ " lg x $\frac{21}{64}$ " diam; insulated; moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Dropping Resistor for 5V3 Plate Voltages | | N16-R-72964-8201 | 3Z6064-3 | Wilkor Prod. Carbolith #CP 1 | Part #X-18550-98, Dwg #A-592 R-115 |
| R-116 | RESISTOR, variable: wire wound 3000 ohms p/m 10%; 1 watt; 3 terminal nuts with solder lugs; phenolic case 1 $\frac{7}{8}$ " diam x $\frac{7}{8}$ " deep; open; round shaft 1 $\frac{1}{4}$ " diam x $\frac{3}{4}$ " lg from mitg surface; special taper, 35% rotation 466 ohms, 30% rotation 882.2 ohms, 65% rotation 1583 ohms; Contact arm grounded to mtg bushing; normal torque; 3 \times 32 bushing $\frac{3}{8}$ " lg from mitg surface; p/o Navy Tube Tester model TV-3/I | Bias Potentiometer Controls Bias Voltage Divider Screen and Bias Volts | | N16-R-90901-1305 | 3Z7330-23 | Hickok Part #16927-1 | Part / Dwg #16927-1 R-116 |
| R-117 | RESISTOR, Same as R-112 | Part of R-112 | | | | | |
| R-118 | RESISTOR, adjustable: wire wound; 8500 ohms p/m 10%; watts; one adjustable sliding contact; $\frac{5}{16}$ " diam x 1 $\frac{3}{4}$ " lg; two mtg brackets supplied; vitreous enamel; two radial tab terminals, one sliding tab terminal | Part of Voltage Divider Used for Calibrating Bias Voltage | | N16-R-43688-3689 | 3Z6585-10 | Mallory-Part # 1AV8300 | Part #18557-5-89 R-118 |

| | | | | | | |
|-------|---|-------------------------------|-------------------------------------|--------------------------------------|---|-------|
| R-119 | RESISTOR, fixed; Composition: 390,000 ohms p in 1' c; 1/2 watt; F characteristic: $\frac{5}{8}$ " long x $\frac{15}{64}$ " diam; moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | N16-R-73258-7057 | Part of Ohmmeter Voltage Divider | Wilkor Prod. Carbofilm #CP 1/2 | Part #X-18552-5 R-120 368 Dwg #A-592 | R-119 |
| R-120 | RESISTOR, Same as R-119 | Same as R-119 | | | R-121 R-122 R-123 | |
| R-121 | RESISTOR, fixed; Composition: JAN type RC20BF470K; 47 ohms p in 10' c; 1/2 watt; Spec. #JAN-R-11 | RC20BF470K N16-R-49427-811 | Neutralizing Resistor | 3RC20BF470K X-18410-472 | Hickok Part # X-18410-472 | 3 |
| R-122 | RESISTOR, Same as #R-121 | Same as R-121 | | | | |
| R-123 | RESISTOR, Same as R-121 | Same as R-121 | | | | |
| R-124 | RESISTOR, fixed; Composition: 40,000 ohms p in 1' c; 1/2 watt; F characteristic: $\frac{5}{8}$ " long x $\frac{15}{64}$ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | N16-R-73130-7657 | Part of Ohmmeter Voltage Divider | 3Z6640-93 | Wilkor Prod. Carbofilm #CP 1/2 | R-124 |
| R-125 | RESISTOR, fixed; Composition: 1400 ohms p in 1' c; 1/2 watt; F characteristic: $\frac{5}{8}$ " long x $\frac{15}{64}$ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | N16-R-73000-9867 | Part of Meter Shunt Mils Ranges | 3Z6140-12 | Wilkor Prod. Carbofilm #CP 1/2 | R-125 |
| R-126 | RESISTOR, fixed; wire wnd; 172.2 ohms p in 1' c; 1/2 watt; body dimen $1\frac{1}{2}''$ lg $\times 1\frac{1}{2}''$ diam excluding term; resistant to humidity; two radial wire stub terminals $\frac{1}{8}''$ lg; ceramic body; p.o. NAVY Model TV-3 U Tube Tester | N16-R-8120C-5279 | Part of Meter Shunt Mils Ranges | 3Z6017 B2-2 | Hickok Part #18673-310 (172.2) | R-126 |
| R-127 | RESISTOR, fixed; wire wnd; 35.92 ohms p in 1' c; 1/2 watt; body dimen $1\frac{1}{2}''$ lg $\times 1\frac{1}{2}''$ diam excluding term; resistant to humidity; two radial wire stub terminals $\frac{1}{8}''$ lg; ceramic body; p.o. NAVY Model TV-3 U Tube Tester | N16-R-81073-5099 | Part of Meter Shunt Mils Ranges | 3Z6003E5-24 | Hickok Part #18673-311 (35.92) Dwg #19430-33 | R-127 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | | ALL SYMBOL DESIGNA- TIONS INVOLVED | CONTRAC- TORS DWG AND PART NO. | MFR AND MFR'S DESIG. | ARMY STOCK NO. | NAVY STOCK NO. | AWS JAN OR NAVY TYPE DESIG. | TOTAL EQUP. NO. |
|------------------|--|--------------------------------------|------------------|-----------------|--|---|--|---|-------------------------------|----------------------|----------------------|---|-----------------------|
| | | | | | | | | | | | | | |
| R-128 | RESISTOR, fixed; wire w'nd; 3.98 ohms p/m 1% _c ; $\frac{1}{2}$ " watt; body dimen $\frac{15}{32}$ " lg x $\frac{1}{2}$ " excluding term; resistant to humidity; two radial wire stub terminals; ceramic body; p/o Navy Model TV-3/U Tube Tester | Part of Meter Shunt Mils Range | N16-R-80907-8699 | 3Z5919319-1 | Hickok Part #18673-303 (3.98) | Part #18673-303 (3.98) Dwg #19430-33 | R-128 | 1 | | | | | |
| R-129 | RESISTOR, fixed; Composition; JAN type RC20BF34K; 330,000 ohms p/m 10% _c ; $\frac{1}{2}$ watt; Spec. #JAN-R-11 | Shunt for Neon Lamp | RC20BF34K | N16-R-50759-811 | Hickok Part #X-1814-332 | X-1814-332 | R-129 | 1 | | | | | |
| R-130 | RESISTOR, fixed; Composition; 1900 ohms p/rn 1% _c ; $\frac{1}{2}$ watt; F characteristic; $\frac{5}{8}$ " long x $\frac{17}{64}$ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Ohmmeter Voltage Divider | N16-R-73009-4101 | 3Z6190-15 | Wilkor Prod. Carbofilm #CP 1 $\frac{1}{2}$ | Part #X-18525-377 Dwg #A-592 | R-130 | 1 | | | | | |
| R-131 | RESISTOR, fixed; Composition; 1050 ohms p/m 1% _c ; $\frac{1}{2}$ watt; F characteristic; $\frac{5}{8}$ " long x $\frac{17}{64}$ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Meter Shunt Voltmeter | N16-R-72994-4551 | 3Z6105-2 | Wilkor Prod. Carbofilm #CP 1 $\frac{1}{2}$ | Part #X-18525-375 Dwg #A-592 | R-131 | 1 | | | | | |
| R-132 | RESISTOR, fixed; Composition; 19,200 ohms p/m 1% _c ; $\frac{1}{2}$ watt; F characteristic; $\frac{5}{8}$ " long x $\frac{17}{64}$ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Voltmeter Multiplier Network | N16-R-73110-9701 | 3Z6619B2-2 | Wilkor Prod. Carbofilm #CP 1 $\frac{1}{2}$ | Part #X-18525-374 Dwg #A-592 | R-132 | 1 | | | | | |
| R-133 | RESISTOR, fixed; Composition; 850 ohms p/m 1% _c ; $\frac{1}{2}$ watt; F characteristic; $\frac{5}{8}$ " long x $\frac{17}{64}$ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Meter Shunt Voltmeter | N16-R-72983-6757 | 3Z6085-6 | Wilkor Prod. Carbofilm #CP 1 $\frac{1}{2}$ | Part #X-18525-376 Dwg #A-592 | R-133 | 1 | | | | | |

| | | | | | | | |
|-------|---|--------------------------------------|------------------|-------------------|---|--|-------|
| R-134 | RESISTOR, fixed; Same as R-109 | Limiting Resistor Short Check | N16-R-S1195-1049 | 3Z60061E5-8 | Hickok Part #8673-414 (65) | Part #18673-414 (65) Dwg #19430-34 | R-135 |
| R-135 | RESISTOR, fixed; wire wind; 65 ohms p m 1 ¹ / ₂ watt; body diameter 1 ¹ / ₄ " lg x 3 ¹ / ₂ " diam excluding term; resistant to humidity; two radial wire stub terminals 1 ¹ / ₈ " lg ceramic body; p.o. Navy Model TV-3 1/Tube Tester | Capacity Calibration | N16-R-S1283-8699 | 3Z6058-3 | Hickok Part #8673-224 (580) | Part #18673-224 (580) Dwg #19430-32 | R-136 |
| R-136 | RESISTOR, fixed; wire wind; 380 ohms p m 1 ¹ / ₂ watt; body diameter 3 ¹ / ₄ " lg x 3 ¹ / ₂ " diam excluding term; resistant to humidity; two radial wire stub terminals 1 ¹ / ₈ " lg ceramic body; p.o. Navy Model TV-3 1/Tube Tester | Capacity Calibration 0.5MF | N16-R-S1283-8699 | 3Z6058-3 | Hickok Part #8673-224 (580) | Part #18673-224 (580) Dwg #19430-32 | R-137 |
| R-137 | RESISTOR, fixed; Composition; 180,000 ohms p m 1 ¹ / ₂ watt F characteristic; 5 ¹ / ₈ " long x 1 ¹ / ₂ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Voltmeter Multiplier Network | N16-R-73216-8257 | 3Z6718-27 | Wilkor Prod. Carbofilm #CP 1 ₂ | Part #X-18525-345 Dwg #A-592 | R-138 |
| R-138 | RESISTOR, fixed; Composition; 300,000 ohms p m 1 ¹ / ₂ watt F characteristic; 5 ¹ / ₈ " long x 1 ¹ / ₂ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Voltmeter Multiplier Network | N16-R-73243-8257 | 3Z6730-48 | Wilkor Prod. Carbofilm #CP 1 ₂ | Part #X-18525-393 Dwg #A-592 | R-139 |
| R-139 | RESISTOR, fixed; Composition; 500,000 ohms p m 1 ¹ / ₂ W; F characteristic; 5 ¹ / ₈ " x 1 ¹ / ₄ " diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve. | Part of Voltmeter Multiplier Network | N16-R-73271-1558 | 3Z6750-107 | Wilkor Prod. Carbofilm #CP 1 ₂ | Part #X-18525-392 Dwg #A-592 | R-140 |
| S-101 | SWITCH, rotary; 18 position 1 section; silver brass contact Phenolic insulation; Body dim 2 ¹ / ₁₆ " x 1 ¹ / ₁₆ " d behind mitg surface; non shorting; solder lug term; Single hole mitg bushing 3 ¹ / ₂ " x 32 ¹ / ₂ " x 1 ¹ / ₄ " lg from mitg surface; 1 ¹ / ₄ " diam shaft 3 ¹ / ₂ " lg from mitg surface; flat shaft; p.o. Navy Model TV-3 1/Tube Tester | Filament Voltage Selector | N17-S-63709-5349 | 3Z9825-62. 379 | Oak #39641-1-2 | Part/Dwg #X-19912-160 | S-101 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | CONTRAC- TORS DWG. AND PART NO. | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL NO. PER EQUIP. |
|------------------|--|---|---|----------------------|----------------------|--|--|----------------------------|
| | | | AWS JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | | | |
| S-102 | SWITCH, push; seven sections each of which is operated by a separate push button independently of the other sections; #1 section, one SPST switch normally open, operated by push button P 1; #2 section, one DPST shorting type switch normally open and one SPDT non shorting type switch, both operated by push button P 2; #3 section, one SPDT non shorting type switch and one DPST switch normally open, both operated by push button P3; #4 section, one DPST normally open and one SPDT non shorting type, both operated by push button P 4; #5 section, one DPST switch normally open, operated by push button P 5; # 6 section, one SPST switch normally open, operated by push button P 6; #7 section, one SPDT non shorting switch, one SPST switch normally open, one DPDT non shorting switch, all three operated by push button P7; door contact arrangement refer to Hickok dwg. #X-19910-50; metal frame with bakelite insulation; o/a body dimensions $6\frac{1}{32}''$ lg x $1\frac{15}{16}''$ high x $1\frac{15}{16}''$ d behind mtg surface, excluding push rods and terminals; shorting type contacts on sections 2 and 3 only as indicated on Hickok Dwg #X - 19910-50; momentary; solder lug term; two $1.40''$ mtg holes on $6\frac{1}{8}''$ mtg/c; seven push rods; .052" thk x $\frac{3}{16}''$ wd extend $\frac{7}{8}''$ from mtg surface; p/o Navy Model TV-3/U Tube Tester. | APPLY proper voltages for Various Tests | NJ7-S-5884-3931 | 3Z0824-3883 | Oak #3W644-130 | Part Dwg #X-19910-50 | S-102 | 1 |

| | | | | | |
|-------|--|---|-------------------|--------------------|-------------------------------------|
| S-103 | SWITCH, rotary: 10 position; 5 section; silver brass cont; Bakelite insulation; Body diam $1\frac{7}{8}$ " x $2\frac{1}{8}$ " overall d. behind mtg surface; non-shorting solder lug term; Single hole mtg bushing $3\frac{3}{8}$ " x $32\frac{3}{8}$ " lg from mtg surface; $1\frac{1}{4}$ " diam shaft $1\frac{3}{16}$ " lg from mtg surface; flattened shaft; p o Navy Model TV-3 T Tube Tester. | N17-S-66623-4964 | 3Z9825-622 378 | Oak #39646-H5 | S-103 Part/dwg #X-19912-159 |
| S-104 | SWITCH, Same as S-103 | | | | |
| S-105 | SWITCH, Same as S-103 | | | | |
| S-106 | SWITCH, toggle: SPST; JAN type ST42A; Spec. JAN-S-23 | ST42A | N17-S-70412-406 | 3Z9863-42A 378 | Hickok Part #X-19911-31 |
| S-107 | SWITCH, toggle: SPDT; JAN type ST42D; Spec. JAN-S-23 | ST42D | N17-S-71894-1344 | 3Z9863-42D 378 | Hickok Part #X-19911-30 |
| S-108 | SWITCH, Same as S-103 | | | | |
| S-109 | SWITCH, Same as S-103 | | | | |
| S-110 | SWITCH, rotary: 10 position; 5 section; silver brass cont; bakelite insulation; Body diam $1\frac{7}{8}$ " x $1\frac{3}{16}$ " overall d. behind mtg surface; non-shorting solder lug term; Single hole mtg bushing $3\frac{3}{8}$ " x $32\frac{3}{8}$ " lg from mtg surface; $1\frac{1}{4}$ " diam shaft $1\frac{3}{16}$ " lg from mtg surface; flattened shaft; p o Navy Model TV-3 T Tube Tester. | ST52N | N17-S-65522-7691 | 3Z9825-622. 377 | Oak #39642-H1 Part/dwg #X-19912-158 |
| S-111 | SWITCH, toggle: DPDT; JAN type ST52N; Spec. JAN-S-23 | Meter Reversing Switch | N17-S-73959-1059 | 3Z9863-52N 376 | Hickok Part #X-19911-29 |
| S-112 | | Master Switch Selects Functions and Ranges | N17-S-66623-6814 | 3Z9825-62. 376 | Oak #39645-H5 Part/dwg X-19912-161 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | AWS, JAN OR NAVY TYPE DESIG. | PARTS | | MFR AND MFR'S DESIG. | CONTRAC- TORS DWG. AND PART NO. | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL EQ'D. TO PART NO. |
|------------------|---|----------------------|--|-------------------------|----------------------|-------------------------------|--|--|-------------------------------------|
| | | | | ARMY STOCK NO. | NAVY STOCK NO. | | | | |
| S-113 | SWITCH, rotary; 6 position; 5 section; silver brass cont; Bakelite insulation; Body diam. $1\frac{7}{8}$ " x $1\frac{9}{16}$ " oval, $2\frac{5}{16}$ " d; non-shorting; solder lug term; Single hole mounting; $\frac{3}{8}$ "-32 bushing, $\frac{1}{4}$ " lg from mitg surface, $\frac{1}{4}$ " diam shaft $\frac{5}{8}$ " lg from mitg surface; flattened shaft; p/o Navy Model TV-3/U tube Tester | Short Test Switch | N117-S-66623-5044 | 3Z0825-62. 375 | Oak #39613-H5 | Part/dwg #X-19912-157 | S-113 | 1 | |
| S-114 | SWITCH, Same as S-111 | Meter Reverse Switch | | | | | | | |
| S-115 | SWITCH, Same as S-110 | Same as S-110 | | | | | | | |
| T-101 | TRANSFORMER, power; filament and plate type; pri 93 V.A.C., 35 amps, 50 to 1600 cycles, single phase; seven secondary windings; secd #1, 117 V (@ .3A tapped at 75 V (@ .3 A, 50 V (@ .3 A, 35 V (@ .3 A, 26 V (@ .3 A, 20 V (@ .3 A, 12.6 V (@ .3 A, 10 V (@ .3 A, 7.5 V (@ .3 A, 6.3 V (@ .3 A, 5 V (@ .3 A, 4.3 V (@ .3 A, 3.0 V (@ .3 A, 2.5 V (@ .3 A, 2 V (@ .3 A, 1.5 V (@ .3 A, and 1.1 V (@ .3 A; secd #2, 5 V (@ .3 A C/T; secd #3, 5 V (@ .2 A C/T; secd #4, 320 V (@ 20 ma; C/T; secd #5, 5 V (@ 30 ma; secd #6, 170 V (@ 70 ma, tapped at 20 V; secd #7, 170 V (@ 70 ma; secd #8, 1750 turns total, 80 $\frac{1}{2}$ turns #19 wire, 669 $\frac{1}{2}$ turns #31 wire, secd #2, 34 turns #19 wire C/T; secd #3, 34 turns #24 wire C/T; secd #4, 2020 turns #34 wire C/T; secd #5, 31 turns #31 wire C/T; secd #6, 1050 turns #33 wire tapped at 930 turns; secd #7, 1050 turns #33 wire; open frame construction; o/a dimen excludng terminals $31\frac{1}{16}$ " x $2\frac{3}{4}$ " x $3\frac{3}{8}$ "-22 solder lug terminals on top, 14 wire lead terminals on bottom; clamp mitg; see Hickok dwg #X-20800-85; acetareinsulation; moisture and fungus proofed per JAN-T-152; p/o Navy Tube Tester Model TV-3/U. | N117-T-73489-5451 | 2Z0614-220 | Hickok Part #X-20800-85 | T-101 | 1 | | | |

| | | | | | | | | |
|-------|--|---|------------------|-------------|-------------|--------------------------|-------|---|
| V-101 | TUBE, electron: JAN type 83; full wave mercury vapor rectifier. | Rectifier Plate Supply | 83 | N16-T-60830 | 2183 | X-20875-28 | V-101 | 1 |
| V-102 | TUBE, electron: JAN type 5Y3 GT/G full wave rectifier. | Rectifier Screen and Bias Supply | 5Y3 GT/G | N16-T-55735 | 2J5Y3GT | Hickok Part #X-20875-28 | V-102 | 1 |
| W-101 | LEAD, grid and plate for light-house tubes; two #18 AWG stranded copper conductors; 16 #30 AWG strands; neoprene insulation, one red & one black; 5 1/2" lg excluding term; both leads terminated one end in special grid and plate connector for light house tubes Ucinite #J-1348-1 & 2, other end of red lead terminated in Amphenol #71-1S red tip plug, other end of black lead terminated in Amphenol #71-1S black tip plug; u/w Navy Tube Tester model TV-3/U. | Adapter for Making Contact to Grid and Plate of Light House Tubes | N17-L-64608-5801 | 3E8000-5 | X-20875-6 | Hickok Part #X-20875-6 | W-101 | 1 |
| W-102 | LEAD, test: One each of #18 AWG stranded copper conductor 41 #34 AWG strands 1 1/2" rubber jacket color coded black and red respectively; Red lead 44" long excluding term, black lead 14" long excluding term; One American Phenolic #71-5 speaker plug connects one end of each lead; opposite end black lead connected to American Phenolic #71-1S black midget plug, opposite end red lead connected to Mueller Electric numbers 45 battery clip and #87 red insulator; p/o Navy Tube Tester Model TV-3/U. | Adapter for Checking Low Value Capacitors | N17-L-64604-3492 | 3E8000-44 | X-20875-8 | Hickok Part #X-12450-8 | W-102 | 1 |
| W-103 | LEAD, test: One #18 AWG stranded copper conductor, 41 #34 AWG strands 1 1/2" black rubber; 7 1/4" long excluding term; American Phenolic #71-1S black midget tip plug on one end and Mueller Electric number 87 insulator and 45 battery clip on other end; p/o Navy Tube Tester Model TV-3/U. | Connects Top Cap of Tubes to Plate Jack | N17-L-63201-4677 | 3E8000-7 | X-20875-145 | Hickok Part #X-12450-145 | W-103 | 1 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | CONTRAC- TOR'S DWG. AND PART NO. | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL QTY PER EQ. CIP |
|------------------|---|---|---|----------------------|--------------------------|--|--|-----------------------------------|
| | | | AWS JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | | | |
| W-104 | LEAD, test: #18 AWG stranded copper conductor, 41 #34 AWG strands, paper wrap, $\frac{1}{2}$ " red rubber insulation; 4 ft long including terminations; American Radio Hdwe #145 red test prod on one end and Amphenol #71-1S red tip plug on other end; p/o Navy Multimeter TV-3/U | Positive Test Lead for Multimeter Section | N17-L-63205-4185 | 3E8000-48 1 | Hickok Part #X-12450-152 | Part/dwg #X-12450-152 | W-104 | 1 |
| W-105 | LEAD, test: #18 AWG stranded copper conductor, 41 #34 AWG, strands, paper wrap, $\frac{1}{2}$ " black rubber insulation; 4 ft long including termination; American Radio Hdwe #145 black test prod on one end and Amphenol #71-1S black tip plug on other end; p/o Navy Multimeter TV-3/U | Negative Test Lead for Multimeter Section | N17-L-63205-4190 | 3E8000-48 | Hickok Part #X-12450-153 | Part #X-12450-153 153 Dwg #X-12450-152 | W-105 | 1 |
| W-106 | LEAD, test: One #18 AWG stranded tinned copper conductor, 7 #28 AWG strands $\frac{1}{2}$ " neoprene black; 10" lg excluding term; One American Phenolic #71-1S black midget tip plug at one end and one Amphenol #63-1 grid cap at other end; p/o Navy Tube Tester Model TV-3/U | Connects Top Caps of Tubes to Grid Jack | N17-L-63201-7851 | 3E8000-10 5 | Amphenol #63-1W | Part/dwg #X-12450-180 | W-106 | 1 |
| W-107 | CABLE ASSEMBLY, power: underwriters type SJ, two #18 AWG stranded conductors, 300 volts working; 7 ft lg excluding terminations Cornish Wire #52 R two contact male appliance plug on one end, other end stripped $\frac{3}{4}$ " and tinned; u/w Navy Tube Tester Model TV-3/U | AC Line Cable | N17-C-48234-4017 | 3E7350.1-84.6 | Cornish Wire #5-108 | Part #3675-11 | W-107 | 1 |

| | | | | | | |
|---|--|--|-----------------------------------|------------------|-------|------|
| W-108 | CABLE, power; type SV; two #18 AWG stranded conductors; rated 300 V working. | Replacement Wire for W-107 | Belden Mfg. Co. Code TINY | #23900-244 | W-108 | 7 ft |
| Note: W-108 is listed as a replacement part only. A molded cable and plug assembly W-107 is used on original equipment. | | | | | | |
| W-109 | WIRE, electrical: insulated .140" OD overall; one #18 AWG conductor; tinned copper; stranded, 65 strands #36 AWG; cotton wrap, rubber insulation .043" thk; rated 5000 volts; red. | Replacement Test Lead Wire; part of W-101, W-102, and W-104 | Belden Mfg. Co. Code TESTER Red | #23900-289 | W-109 | 9 ft |
| W-110 | WIRE, electrical: insulated .140" OD overall; one #18 AWG conductor; tinned copper; stranded 65 strands #36 AWG; cotton wrap, rubber insulation .043" thk; rated 5000 volts; black. | Replacement Test Lead Wire, part of W-101, W-102, W-103, W-105 and W-106 | Belden Mfg. Co. Code TESTER Black | #23900-288 | W-110 | 8 ft |
| X-101 | SOCKET, tube: 4 contact; Molded in saddle mtg; Two $\frac{5}{32}$ " mtg holes on $1\frac{1}{2}$ " mtg/c. Round nica filled brown bakelite 1.172" dia x $1\frac{15}{32}$ " h, excluding term; brass, cad plated. | 83 Rectifier Tube Socket | Amphenol Part #77MIP4T | Part #X-19350-80 | X-101 | 1 |
| X-102 | SOCKET, tube: 8 contact octal; Molded in saddle mtg; Two $\frac{5}{32}$ " mtg holes on $1\frac{1}{2}$ " mtg/c. Round nica filled brown bakelite 1.172" dia x $1\frac{15}{32}$ " h, excluding term; brass cad plated. | 5Y3 Rectifier Tube Socket | Amphenol Part #77MIP8T | Part #X-19350-79 | X-102 | 1 |
| X-103 | SOCKET, tube: 4 contact; Retainer ring mounting; One $1\frac{1}{16}$ " keyed mtg hole; Round mica filled brown bakelite 1.172" dia x $7\frac{1}{16}$ " h, excluding term; brass cad plated. | 4 Pin Tube Test Socket | Amphenol 78S4T | Part #X-19350-68 | X-103 | 1 |
| X-104 | SOCKET, tube: 5 contact; Retainer ring mounting; One $1\frac{1}{16}$ " keyed mtg hole; Round mica filled brown bakelite 1.172" dia x $7\frac{1}{16}$ " h, excluding term; brass cad plated. | 5 Pin Tube Test Socket | Amphenol 78S5T | Part #X-19350-69 | X-104 | 1 |
| X-105 | SOCKET, tube: 6 contact; Retainer ring mounting; One $1\frac{1}{16}$ " keyed mtg hole; Round mica filled brown bakelite 1.172" dia x $7\frac{1}{16}$ " h, excluding term; Phos bronze cad plated. | 6 Pin Tube Test Socket | Amphenol 78S6T | Part #X-19350-70 | X-105 | 1 |

TABLE 8-4 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

| SYMBOL DESIG. | NAME OF PART AND DESCRIPTION | FUNCTION | PARTS | | | | ALL SYMBOL DESIGNA- TIONS INVOLVED | TOTAL PER EQUIP. NO. |
|------------------|--|----------------------------------|---|----------------------|----------------------|-------------------------------|--|----------------------------|
| | | | AWS JAN OR NAVY TYPE DESIG. | NAVY STOCK NO. | ARMY STOCK NO. | MFR AND MFR'S DESIG. | | |
| X-106 | SOCKET, tube; 7 contact; large and small; Retainer ring mounting; One $1\frac{1}{16}$ " keyed mtg. hole; Round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$ " h excluding term; brass cad plated; pilot light test socket in center. | 7 Pin Tube Test Socket | N16-S-62762-2635 | 2Z8677.140 | Amphenol 78-7C17 | Part #X-19350-71 | X-106 | 1 |
| X-107 | SOCKET, tube; 8 contact, octal; Retainer ring mounting; One $1\frac{1}{16}$ " keyed mtg. hole; Round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$ " h, excluding term; brass cad plated. | 8 Pin (Octal) Tube Test Socket | N16-S-63462-8245 | 2Z8678.318 | Amphenol 78-S8F | Part #X-19350-73 | X-107 | 1 |
| X-108 | SOCKET, tube; 8 contact, loktal; Retainer ring mounting; One $1\frac{1}{16}$ " keyed mtg. hole; Round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$ " h, excluding term; brass cad plated. | 8 Pin (Loktal) Tube Test Socket | N16-S-63579-2635 | 2Z8678.35 | Amphenol 78-817 | Part #X-19350-72 | X-108 | 1 |
| X-109 | SOCKET, tube; 7 contact miniature; Saddle mtg; Two $1\frac{1}{2}$ " mtg holes on $\frac{1}{8}$ " mtg. c; Round mica filled brown bakelite $1\frac{3}{8}$ " lg x $4\frac{1}{16}$ " wd x $1\frac{9}{16}$ " h, excluding term; brass cad plated. | 7 Pin Miniature Tube Test Socket | N16-S-62603-6198 | 2Z8677.142 | Amphenol #140-170-24 | Part #X-19350-76 | X-109 | 1 |
| X-110 | SOCKET, tube; 7 contact acorn type, special for testing acorn tubes with either 5 or 7 radial pins; mounts under panel; five $\frac{1}{8}$ " diameter mtg holes in flange of shell, $1\frac{3}{16}$ " diam cut out in panel; round mica filled phenolic body $1\frac{7}{8}$ " diam x $1\frac{1}{2}$ " deep; phosphor bronze silver plated contacts; spring loaded round silver plated brass plunger contact in base for end pin connection; P/o Navy Tube Tester model TV-3/U. | Acorn Type Tube Socket | N16-S-62646-8291 | 2Z8677.139 | Alden #457V-1 | Part/dwg #19350-74 | X-110 | 1 |

| | | | | | |
|-------|--|--|------------------------------|---------------------------------|---|
| X-111 | SOCKET, tube; 9 contact \| 9 Pin (Miniature) miniature; Saddle mounting; Two .055" mtg holes on $\frac{1}{8}$ " mtg/c.; Round mica tilted brown bakelite $\frac{7}{8}" \times \frac{11}{16}"$ h excluding term; brass cadmium plated. | Tube Test Socket | Part #X-19350- X-111 58 | Cinch #53F12884 | 1 |
| X-112 | SOCKET, tube; 8 contact, sub-miniature; one piece saddle mtg; two $\frac{1}{8}$ " diam mtg holes on $\frac{5}{8}$ " mtg/c.; round mica filled phenolic body $\frac{3}{8}"$ diam $\times \frac{19}{64}"$ h excluding terminals; flatted sides for locking in mtg saddle; phosphor bronze silver plated contacts; center shield $\frac{3}{32}"$ ID. | Test socket for sub- miniature tubes | Cinch Mfg. Corp. #8694 | Part/dwg #19350-101 X-112 | 6 |
| | BUTTON, push: p/o Navy tube tester Model TV-3/U; Phenolic black, $\frac{15}{32}"$ length $\frac{1}{16}"$ $\frac{1}{16}"$ dia, push on type to fit .052" $\times \frac{5}{16}"$ flat shaft, with spring; No dimension greater than $\frac{1}{8}"$ | Part of S-102 | N117-B-840101- 117 | 2Z1480.47 | Friedman Co. #S-330-30 |
| | BUTTON, Push: p/o Navy tube tester Model TV-3/U; Phenolic, red $\frac{15}{32}"$ long $\frac{1}{16}"$ $\frac{1}{16}"$ dia, push on type to fit .052" \times $\frac{1}{16}"$ dia, push on type to fit .052" $\times \frac{5}{16}"$ flat shaft, with spring; No dimension larger than $\frac{1}{8}"$ | Part of S-102 | N117-B-840101- 118 | 2Z1480.48 | Friedman Co. #S-330-30 |
| | KNOB: bar, black phenolic; for $\frac{1}{4}"$ diam shaft; single 8-32 set screw; filled white dot; 1 $\frac{13}{32}"$ lg $\frac{7}{8}"$ wd $\times \frac{13}{16}"$ h o/a; shaft hole $\frac{3}{4}"$ deep; small metal pointer on lower front edge. | Adjustment Knob for all Rotary Switches with Indexing Etched on Panel | N117-K-700073- 551 | 2Z5821-142 | Hickok Part #11500-11 |
| | KNOB: bar, black phenolic; for $\frac{1}{4}"$ diam shaft; single 8-32 set screw; filled white dot; $1\frac{1}{2}"$ lg $\frac{7}{8}"$ wd $\times \frac{3}{16}"$ h o/a; shaft hole $\frac{3}{4}"$ deep. | Adjustment Knob for Selector Switches with Dials under Panel | N117-K-700068- 701 | 2Z5821-141 | Hickok Part #11500-12 |
| | SHEET, instruction; operating data; Navy Tube Tester Model TV-3/U; cardboard, white stock, black print; Rec- tangular $4\frac{1}{2}"$ wide $\times 16"$ long; Slides under flanged edging | Operating Data | N16-S-290001- 101 | 6D18100 | Hickok Part #X-3122-6 and Part #X-3122-7 |

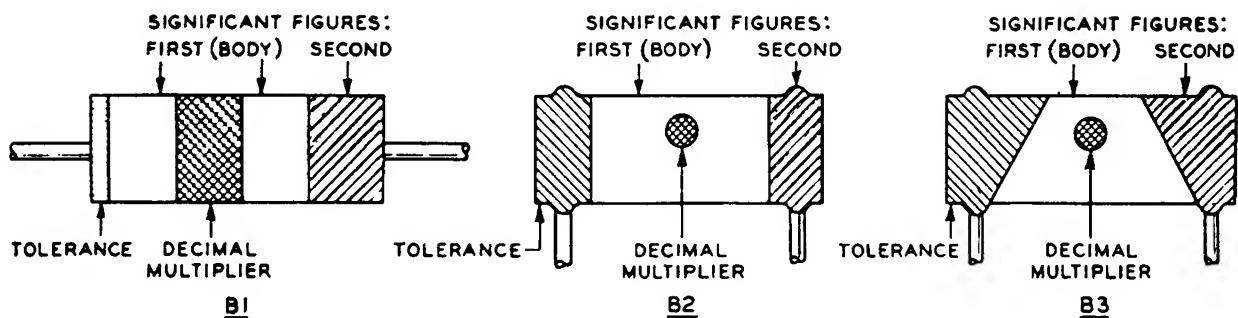
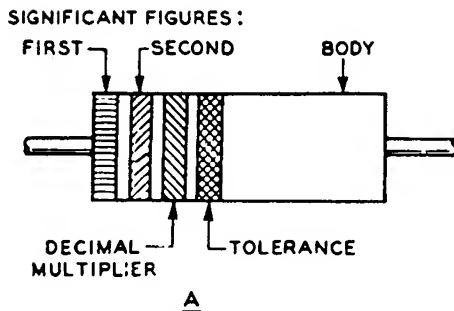
TABLE 8-5. CROSS REFERENCE PARTS LIST

| JAN DESIGNATION | KEY SYMBOL | STD. NAVY STOCK NO. | KEY SYMBOL | STD. NAVY STOCK NO. | KEY SYMBOL |
|-----------------|------------|---------------------|------------|---------------------|--------------|
| CE63C10E | C103 | 16-R-67303-2596 | R103 | 16-S-117101-262 | I103 |
| CM20B471K | C104 | 16-R-72919-2658 | R111 | 16-S-290001-101 | Sheets, Ins, |
| CM30B272K | C102 | 16-R-72964-8201 | R115 | 16-S-290001-102 | N101 |
| CP26AEF104K | C105 | 16-R-72975-7158 | R110 | 16-T-55735 | V102 |
| RC20BF184K | R104 | 16-R-72983-6757 | R133 | 16-T-60830 | V101 |
| RC20BF334K | R129 | 16-R-72994-4551 | R131 | 17-B-840101-117 | Button, Push |
| RC20BF470K | R121 | 16-R-73000-9867 | R125 | 17-B-840101-118 | Black |
| RC30BF122K | R106 | 16-R-73009-4101 | R130 | 17-C-48234-4017 | Button, Push |
| RC30BF133J | R109 | 16-R-73110-9701 | R132 | 17-C-73108-1999 | Red |
| RP101FD201KK | R113 | 16-R-73135-6901 | R101 | 17-C-73108-2000 | W107 |
| RW31F101T | R103 | 16-R-73138-7657 | R124 | 17-K-700068-701 | J101 |
| RW31F182 | R107 | 16-R-73216-5057 | R137 | 17-K-700073-551 | J102 |
| SI42A | S106 | 16-R-73218-8257 | R138 | 17-L-62917 | Knob, bar |
| SI42D | S107 | 16-R-73258-7057 | R119 | 17-L-6686 | Knob, bar |
| SI52N | S111 | 16-R-73271-1558 | R139 | 17-L-6793 | E101 |
| 5Y3GT/G | V102 | 16-R-73454-3176 | R114 | 17-L-50844-4672 | E102 |
| 83 | V101 | 16-R-80907-8699 | R128 | 17-L-51678-3452 | E103 |
| | | 16-R-81073-5099 | R127 | 17-L-63201-4677 | J105 |
| | | 16-R-81081-6369 | R108 | 17-L-63201-7851 | J108 |
| | | 16-R-81105-1049 | R135 | 17-L-63205-485 | W103 |
| | | 16-R-81119-051849 | R102 | 17-L-63205-4190 | W106 |
| | | 16-R-81205-5279 | R126 | 17-L-64608-5801 | W104 |
| | | 16-R-81268-8699 | R136 | 17-L-64610-3492 | W105 |
| | | 16-R-90301-2675 | R113 | 17-L-64610-5801 | W102 |
| | | 16-R-90901-1305 | R116 | 17-L-70850-3998 | W101 |
| | | 16-R-92231-4201 | R112 | 17-M-29380-5596 | M101 |
| | | 16-S-60841-4271 | X103 | 17-R-50882-2338 | CR101 |
| | | 16-S-60852-2111 | X101 | 17-S-58845-3931 | S102 |
| | | 16-S-61703-9581 | X104 | 17-S-60522-7969 | S110 |
| | | 16-S-62152-2626 | X105 | 17-S-63709-5349 | S101 |
| | | 16-S-62603-6198 | X109 | 17-S-66623-4964 | S103 |
| | | 16-S-62646-8291 | X110 | 17-S-66623-5044 | S113 |
| | | 16-S-62762-2635 | X106 | 17-S-66623-6814 | S112 |
| | | 16-S-63462-8245 | X107 | 17-S-70412-4406 | S106 |
| | | 16-S-63516-6564 | X102 | 17-S-71894-1544 | S07 |
| | | 16-S-63579-2635 | X108 | 17-S-73959-1025 | S111 |
| | | 16-S-64063-6220 | X111 | 17-T-73489-5451 | T101 |
| | | 16-S-17101-260 | X104 | | |
| | | 16-S-17101-261 | R107 | | |

TABLE 8-5. CROSS REFERENCE PARTS LIST (Cont.)

| SIGNAL CORPS STOCK NO. | KEY SYMBOL | SIGNAL CORPS STOCK NO. | KEY SYMBOL | SIGNAL CORPS STOCK NO. | KEY SYMBOL |
|------------------------|--------------------|------------------------|------------|------------------------|------------|
| 2J83 | V101 | 2Z8679.25 | X111 | 3Z4020-260 | R111 |
| 2J5Y3GT | V102 | 2Z9619-220 | T101 | 3Z4058-3 | R136 |
| 2Z1480.47 | Button, push black | 3DA100-730 | C105 | 3Z4064-3 | R115 |
| | Button, push red | 3DA230-471 | C101 | 3Z4080-66 | R110 |
| 2Z1480.48 | I105 | 3DB100-45 | C103 | 3Z4085-6 | R13 : |
| 2Z3718.135 | I104 | 3E7350-1-84.6 | W107 | 3Z6105-2 | R131 |
| 2Z3718.136 | I103 | 3E8000-5 | W101 | 3Z6140-12 | R125 |
| 2Z3718.137 | I102 | 3E8000-7 | W103 | 3Z6190-15 | R130 |
| 2Z3718.138 | I101 | 3E8000-10.5 | W106 | 3Z6585-10 | R118 |
| 2Z3718.142 | O101 | 3E8000-44 | W102 | 3Z661932-2 | R132 |
| 2Z3876.108 | J102 | 3E8000-48 | W105 | 3Z4637 | R101 |
| 2Z5581.4 | J101 | 3E8000-48.1 | W104 | 3Z6640-93 | R124 |
| 2Z5581.5 | I101 | 3F3299.9.2 | M101 | 3Z6718-27 | R137 |
| 2Z5821.141 | I101 | 3H4838-15.3 | CR101 | 3Z6730-48 | R138 |
| 2Z5821.142 | Knob, bar | 3K2047121 | C104 | 3Z6739-12 | R119 |
| 2Z5889.16 | E103 | 3K3027221 | C102 | 3Z6750-107 | R139 |
| 2Z5952 | E101 | 3RC201BF84K | R104 | 3Z7150-9 | R112 |
| 2Z5956.16 | J105 | 3RC201BF334K | R1-9 | 3Z7330-23 | R116 |
| 2Z5991.3 | I110 | 3RC201BF70K | R121 | 3Z6824-38.3 | S102 |
| 2Z7091.225 | H101 | 3RC301BF122K | R106 | 3Z6825-62.375 | S113 |
| 2Z8674.158 | X103 | 3RC301BF53J | R109 | 3Z6825-62.376 | S112 |
| 2Z8674.159 | X101 | 3R16007 | R113 | 3Z6825-62.377 | S110 |
| 2Z8675.92 | X104 | 3RV18326 | R103 | 3Z6825-62.378 | S103 |
| 2Z8676.96 | X105 | 3RV25819 | R107 | 3Z6825-62.379 | S101 |
| 2Z8677.139 | X110 | 3Z599319.1 | R128 | 3Z6863-42A | S106 |
| 2Z8677.140 | X106 | 3Z6001E18-3 | R114 | 3Z6863-421 | S107 |
| 2Z8677.142 | X109 | 3Z6003E5-24 | R127 | 3Z6863-52N | S111 |
| 2Z8678.35 | X108 | 3Z6004E5-12 | R108 | 6D10124-2 | N101 |
| 2Z8678.318 | X107 | 3Z6006E5.8 | R135 | 6D18100 | E102 |
| 2Z8678.319 | X102 | 3Z6015-102 | R102 | 6Z6806.14 | J108 |
| | | 3Z6017B2.2 | R126 | 6Z6832 | |

Sheets, Inc.,
E102
J108

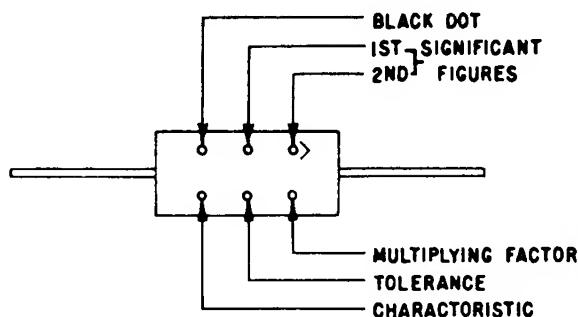


| Color | First Significant Figure | Second Significant Figure | Decimal Multiplier | Tolerance |
|----------|--------------------------|---------------------------|--------------------|------------|
| Black | 0 | 0 | 1 | — |
| Brown | 1 | 1 | 10 | $\pm 1\%$ |
| Red | 2 | 2 | 100 | $\pm 2\%$ |
| Orange | 3 | 3 | 1,000 | $\pm 3\%$ |
| Yellow | 4 | 4 | 10,000 | $\pm 4\%$ |
| Green | 5 | 5 | 100,000 | $\pm 5\%$ |
| Blue | 6 | 6 | 1,000,000 | $\pm 6\%$ |
| Violet | 7 | 7 | 10,000,000 | $\pm 7\%$ |
| Gray | 8 | 8 | 100,000,000 | $\pm 8\%$ |
| White | 9 | 9 | 1,000,000,000 | $\pm 9\%$ |
| Gold | — | — | 0.1 | $\pm 5\%$ |
| Silver | — | — | 0.01 | $\pm 10\%$ |
| No color | — | — | — | $\pm 20\%$ |

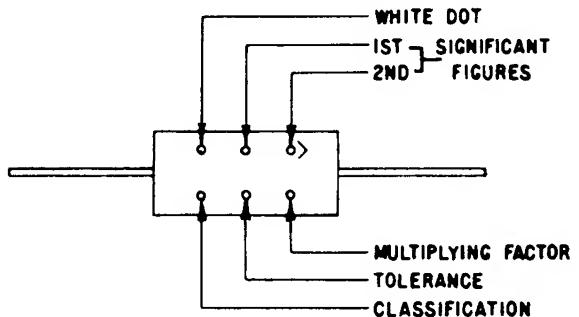
—Fixed Resistors: RMA and AWS Standard Color Codes

TABLE 8-6. APPLICABLE COLOR CODES — RESISTORS

JAN COLOR CODE
FOR
MOLDED MICA CAPACITORS



1946 RMA COLOR CODE
FOR
MOLDED MICA CAPACITORS



| COLOR | SIGNIFICANT FIGURE | MULTIPLYING VALUE(MMF) | % TOL. | CHARA. * |
|--------|--------------------|------------------------|--------|----------|
| BLACK | 0 | 1 | ±20 | A |
| BROWN | 1 | 10 | | B |
| RED | 2 | 100 | ±2 | C |
| ORANGE | 3 | 1,000 | | D |
| YELLOW | 4 | 10,000 | | E |
| GREEN | 5 | | | F |
| BLUE | 6 | | | G |
| VIOLET | 7 | | | |
| GRAY | 8 | | | |
| WHITE | 9 | | | |
| GOLD | | 0.1 | ±5 | |
| SILVER | | 0.01 | ±10 | |

* THESE LETTERS INDICATE COMBINATIONS OF VARIOUS ELECTRICAL CHARACTERISTICS. FOR DETAILS SEE SPECIFICATION JAN-C-5.

NOTE: VOLTAGE RATINGS VARY WITH CAPACITANCE.

NOTE: IF BOTH ROWS OF DOTS ARE NOT ON ONE FACE; ROTATE CAPACITOR ABOUT AXIS OF LEADS TO READ SECOND ROW ON SIDE OR REAR.

| COLOR | SIGNIFICANT FIGURE | MULTIPLYING VALUE(MMF) | % TOL. | CLASS. * |
|--------|--------------------|------------------------|--------|----------|
| BLACK | 0 | 1 | ±20 | A |
| BROWN | 1 | 10 | | B |
| RED | 2 | 100 | ±2 | C |
| ORANGE | 3 | 1,000 | ±3 | D |
| YELLOW | 4 | 10,000 | | E |
| GREEN | 5 | | | F |
| BLUE | 6 | | | G |
| VIOLET | 7 | | | H |
| GRAY | 8 | | | I |
| WHITE | 9 | | | J |
| GOLD | | 0.1 | | |
| SILVER | | 0.01 | ±10 | |

* THESE LETTERS INDICATE COMBINATIONS OF VARIOUS ELECTRICAL CHARACTERISTICS PER RMA STANDARDS.

NOTE: VOLTAGE RATINGS VARY WITH CAPACITANCE.

NOTE: IF BOTH ROWS OF DOTS ARE NOT ON ONE FACE; ROTATE CAPACITOR ABOUT AXIS OF LEADS TO READ SECOND ROW ON SIDE OR REAR.

TABLE 8-7. APPLICABLE COLOR CODES - CAPACITORS

LIST OF MANUFACTURERS

| ABBREVIATIONS | MFRS PREFIX | NAME | ADDRESS |
|-------------------------|-------------|----------------------------------|--|
| Alden..... | CYA | Alden Products Co..... | 117 N. Main St., Brockton 64, Mass. |
| Amphenol..... | CPH | American Phenolic Corp..... | 1830 S. 54th Ave., Chicago 50, Ill. |
| Bradley..... | | Bradley Laboratories Inc..... | 80 Meadow St., New Haven 10, Conn. |
| Cinch..... | CMG | Cinch Mfg. Corp..... | 2335 W. Van Buren, Chicago 12, Ill. |
| Continental Carbon..... | CCC | Continental Carbon Co..... | 13900 Lorain Ave., Cleveland, Ohio |
| Cornell Dubilier..... | CD | Cornell Dubilier Elec. Corp..... | 333 Hamilton Blvd., S. Plainfield, N.J. |
| Cornish..... | | Cornish Wire Co..... | Room 1010, 15 Park Row, New York, N.Y. |
| Drake..... | CAYS | Drake Mfg. Co..... | 1713 W. Hubbard St., Chicago 22, Ill. |
| Eby..... | CEB | Hugh H. Eby Inc..... | 18 W. Chelten Ave., Phila. 44, Penna. |
| Friedman..... | | Friedman Co..... | 220 West 23rd St., New York, N.Y. |
| G. E..... | CG | General Electric Co..... | 1 River Road, Schenectady, N.Y. |
| Kurz-Kasch..... | CAUP | Kurz-Kasch Co. Inc..... | 1417 S. Broadway, Dayton 1, Ohio |
| Mallory..... | CMA | P. R. Mallory & Co..... | 3029 E. Washington St., Indianapolis, Ind. |
| Oak Mfg. Co..... | CO | Oak Mfg. Co..... | 1260 Clybourne Ave., Chicago 10, Ill. |
| Solar..... | CSL | Solar Mfg. Co..... | 1445 Hudson Blvd., N. Bergen, N.J. |
| Sylvania..... | CHS | Sylvania Elec. Prod. Inc..... | 500 Fifth Ave., New York 18, N.Y. |
| Tung-Sol..... | CTL | Tung-Sol Lamp Works Inc..... | 100 8th Ave., Newark 4, N.J. |
| Ucinite..... | CUF | The Ucinite Co..... | 1 Nevada St., Newtonville, Mass. |
| Wilkor..... | CBIQ | Wilkor Products Co..... | 3835 W. 150th St., Cleveland, Ohio |